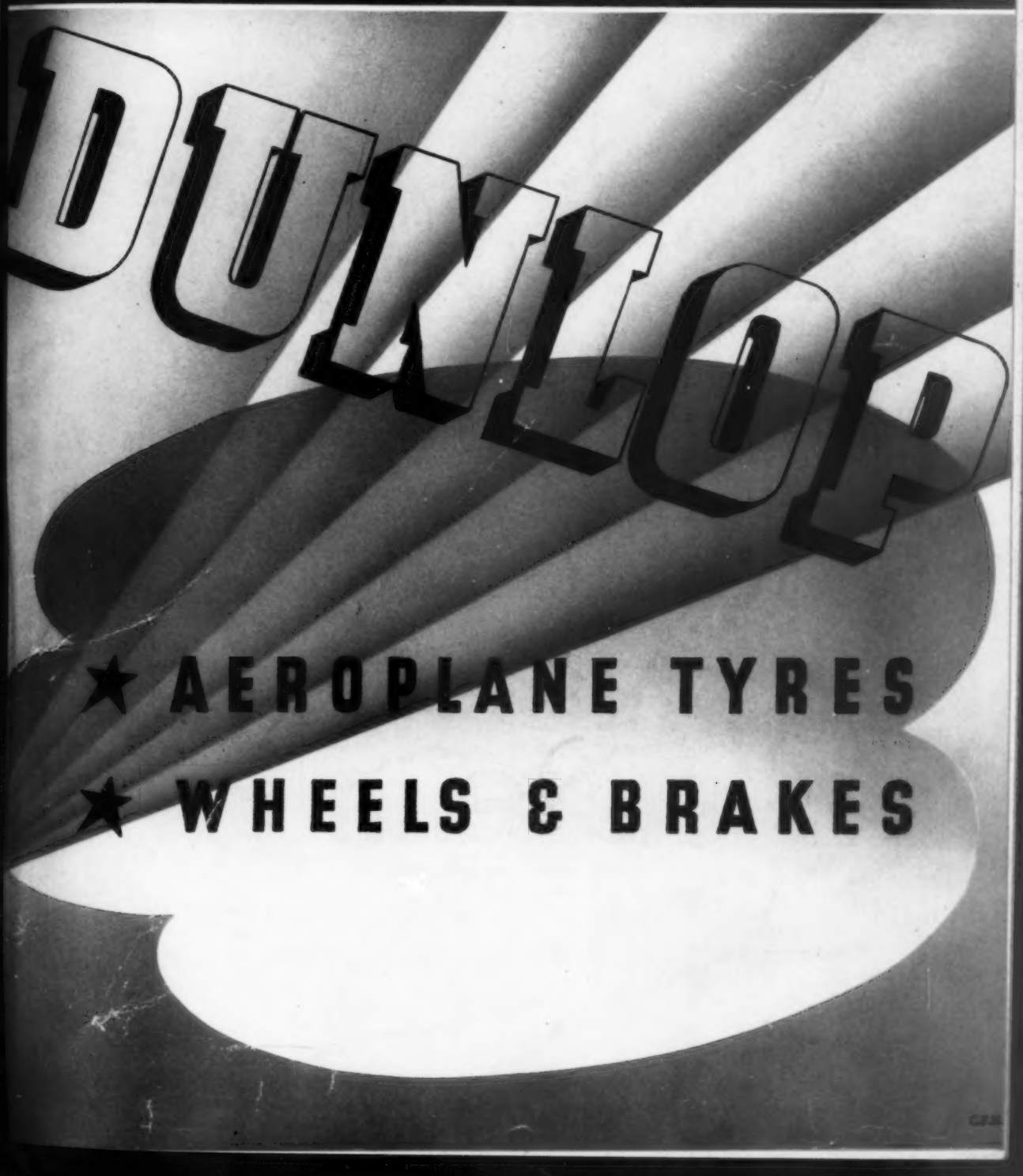
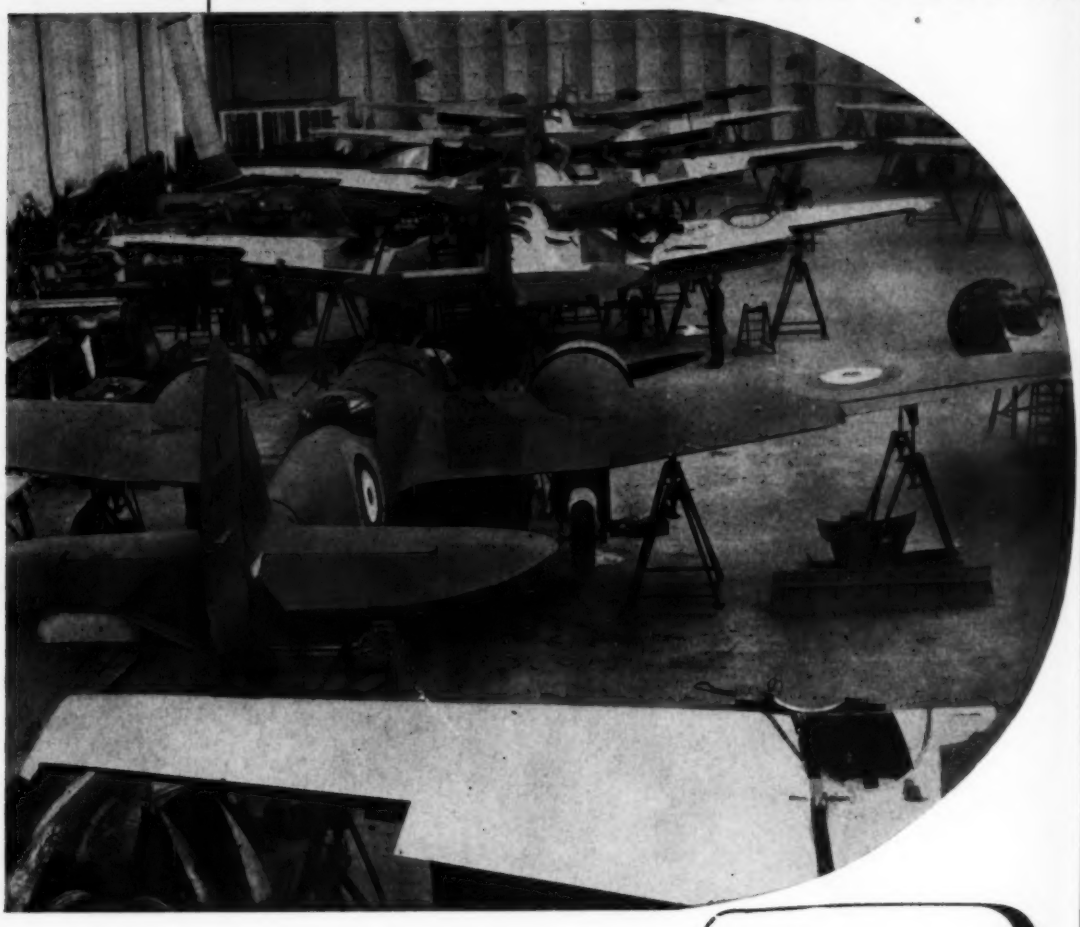
FLIGHT
AIRCRAFT ENGINEER
AND AIRSHIPS



BLENHEIM IN PRODUCTION...



"Bristol"

BLENHEIM BOMBER

5 The air-frame having been removed from its jig, is now fitted with wings and tail-plane, and the Blenheim "stands on its own legs" for the first time. The fitting of the airscrews, turret, and other equipment is then proceeded with.

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FLIGHT

The AIRCRAFT ENGINEER AND AIRSHIPS

FIRST AERONAUTICAL WEEKLY IN THE WORLD : FOUNDED 1909

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The Outlook

7,162 *Miles—*

IT has become a trite saying that when Louis Blériot flew across the English Channel in 1909 Great Britain ceased to be an island. In years to come it may well be that the flight of the Wellesleys to Australia may be looked upon in a somewhat similar light. Australia has, until the advent of flying, been far removed in time as well as in distance not only from England but from any possible or probable air menace in time of war.

While the non-stop flight from Egypt to Darwin has shown that reinforcements can reach Australia in a very short time, should the need arise, it also brings home the fact that not for very many years is Australia likely to remain outside practical bombing range. And, incidentally, the distance from Ismailia to Darwin is approximately the same as that from Europe to New York and back. Thus the United States of America may not always be able to maintain their present aloof and splendid isolation from European affairs. Admittedly, it is a far cry from 7,200 miles with petrol only on board to the same distance with a bomb load carried half the way, but the record flight of to-day has a habit of becoming the commonplace flight of to-morrow. Certainly Mr. Cy Caldwell will not miss the significance of this fact, even if the White House should do so.

—*And* 20,924 *Machine Miles*

PERHAPS the most remarkable feature of a very remarkable flight is the fact that it was made not by one but by three aeroplanes. That in itself must surely constitute a record. Translated into figures it means that two of the machines flew 14,324 aircraft miles and the third added another 6,600 miles to that, making the rather staggering total of 20,924 aircraft miles flown non-stop. The obvious view of the flight, and the one which detractors of British aviation took before the start, is that by sending off three machines we made fairly certain of at least one of them getting through. That all three beat the existing world's record held by Russia must have come as something of a shock to such people. The sane way to look at it, however, is that we had so much faith in our machines that we were certain we could not merely beat the world's record once but three times. *And* we did.

Geodetic Vindication

FROM the technical aspect the Egypt-Australia flight has many interesting and instructive lessons.

First and foremost, it must be admitted that it vindicates completely the claims made for the advantages of geodetic construction by Mr. B. N. Wallis. Briefly summed up, the argument is that this type of construction is about comparable with the more orthodox forms when the aspect ratio of the wings is normal, but that for high aspect ratio it is more efficient. The aspect ratio of the Wellesley is nearly nine (when defined as span²/wing area), and the ratio of gross weight to tare weight at the start of the flight was 2.40, which is probably greater than that of any comparable machine and means that when they took off from Egypt each of the Wellesleys was carrying nearly one-and-a-half times its own weight!

In spite of the heavy loading (30 lb. per sq. ft.) the machines got away well and without any terrifyingly long run, according to observers who were present at the start. It is not, perhaps, always recognised that high aspect ratio assists the take-off very materially, and also the subsequent climb, as induced drag is com-

RECORD BREAKERS IN TRIPLICATE : The three Vickers Wellesley monoplanes (special Bristol Pegasus XXII) of the Long Range Development Flight which have added so much lustre to the name of the R.A.F. as a record-breaking service by eclipsing the world's long-distance record. The full story of their joint achievement appears on pages 426-428 of this issue.

paratively low. Once in the air, and with their undercarriages tucked-up, the machines are extremely clean, and this aerodynamic efficiency was, of course, reflected in the fuel consumption and range. A gratifying feature of the flight is the high average speed, which works out at approximately 150 m.p.h.

Altogether the flight is one which has brought great prestige to British aviation in general, and to the Vickers and Bristol firms and the Royal Air Force in particular. We have shown what we can do when we really go out for a record and it would be well to follow up this magnificent success by an attempt on the world's landplane speed record, which now stands to the credit of Generalmajor Udet on a Heinkel He 112U with a speed of 394 m.p.h.

"D.O.S.I."?

LAST February and March questions were asked in the House of Commons about the treatment of officers serving in the Civil Aviation Dept. of the Air Ministry, and Lord Swinton, then Air Minister, appointed a committee of three, with Sir James Rae as chairman, to enquire into the matter. The directorate concerned was that of Operational Services and Intelligence, which assumed its present form in March last year. The report of the committee has now been published.

When the department was reorganised in 1937 two officers were given notice, though both were offered other employment under the D.C.A. The committee enquired most carefully into both cases—the individuals being described as "Mr. A." and "Mr. B," though those familiar with the department may make good guesses at their identity—and found that in both cases the action taken was justified, but that the officers concerned ought to have had earlier notice.

For the rest, the committee found that the directorate was understaffed, and also that there were not enough civil servants of experience in the directorate. The report remarks that "there must be developed and encouraged the ideal of an organisation bound together by feelings of loyalty and mutual help and a desire to give service to the various interests involved."

It appears, therefore, that there is nothing wrong with the principles on which this directorate is planned, but that certain details needed to be put right. Results are often largely affected by right or wrong working of details inside an organisation, and we may join with the committee in saying of D.O.S.I., "We look forward to the future with confidence."

A Disregarded Gap

PARLIAMENT is now very busily engaged in considering our defence arrangements, and is particularly interested in discovering gaps in our national palisades. So far, most attention has been concentrated on anticraft guns and A.R.P. The A.A. guns have, so to speak, taken the bit in their teeth and run away with Parliament, with the result that deficiencies in fighter aircraft equipment and in supplies of searchlights have been rather overlooked. Still, we are assured that the War Office and the Air Ministry are using their best endeavours to expedite the supply of new patterns of both. Also, we recognise that, though the guns have monopolised a somewhat undue share of attention, it is right that air defence in general and air protection should take first place in our national anxieties.

That does not mean, however, that no attention ought to be paid to other weak joints in our armour. *Flight* has before now deprecated overmuch lashing of a willing horse, and those who are dealing with air defence are willing enough to put right what is wrong. There are, however, other horses in the team which we cannot call willing, and there the Parliamentary whip ought to be cracked. There is at least one point where there seems no intention of making provision for war, and that is the provision of a proper air arm for the Army.

Protecting the Army's Eyes

GOVERNMENT pronouncements on the rôle of our Army in a European war have been hazy. Some authorities hold that we ought to confine our efforts to a naval blocade of the enemy and the provision of an air striking force. That presupposes that France, which would certainly be our ally, would supply an Army strong enough to win the land campaign. But if the French Army were outnumbered and in danger of defeat, Britain could not possibly refuse to give help on land. When one is at war one must make every exertion to win that war, for defeat is the most expensive and disastrous thing of all. Therefore, it seems that the British Army must be equipped to fight on the Continent.

We need not labour the point that a modern Army cannot work without air reconnaissance, and it follows that if all its reconnaissance aircraft are shot down any Army will be worth exactly nothing. Again, it follows that those specialised aircraft must be defended against the attacks of enemy fighter aircraft, while at the same time the air scouts (using the word in its true and not its 1918 sense) must be stopped so far as possible from spying out the doings of our own troops. The conclusion is that our Army must have fighters. It has none.

On manœuvres the Army always borrows so many fighter squadrons from the Air Force "for duration." Presumably the idea is that in time of war the Air Force would also lend the Army such fighter squadrons as the latter may require. We ask, in all seriousness, is there the slightest chance of the Air Force being able to respond to such a request? We can see no chance at all.

The Present Position

THERE are at present seven regular squadrons of Army co-operation machines and three more belonging to the Auxiliary Air Force which are earmarked for work with the Territorial Army. At the moment we are not concerned to ask if that number of squadrons is enough or whether all of them have yet been equipped with the Lysander aeroplane. Our point is that Army co-operation machines are not fighters and ought not to be asked to fight. When defending themselves they cannot either reconnoitre or spot for the guns. They ought to receive protection from fighter patrols.

Now for the fighter position. No. 11 (Fighter) Group is responsible for the defence of London, and has a strength of nineteen squadrons. No. 12 (Fighter) Group has charge of the Midlands and North, and its strength is eleven squadrons. Can anyone say that either Group is so strong in numbers that, after providing duty squadrons by day and by night, it could spare many (or any) squadrons for the use of the Army? One may imagine the outcry from the citizens if, after suffering a certain amount of bombing, they learnt that some of the fighter squadrons raised for their defence had been sent overseas with the Army. The Army itself would suffer if its munition works at home were bombed because there were not enough fighters to protect them.

The only solution is the allocation of a number of fighter squadrons for use with the Army. There may be difficulties about providing them—there always are in any innovation—but the alternatives are either leaving the Army blind or depleting home defence.

Status

YEARS ago a number of people had the idea that transport pilots would eventually become little more than superior bus-drivers. To some extent the strength of this idea, if it was in fact true as a possibility, has been reduced by the effects of modern methods of navigation, which have demanded a great deal of careful training as well as adequate experience.

Now, however, one finds that this bus-driving idea is tending to crop up again—not amongst normally interested people, but with the companies themselves. In their endeavour to reduce operating costs they are probably thinking of means by which the salary bill can be lessened, and the idea of gradually reducing the status of pilots is an obvious means of setting about this task.

Training and experience are still abundantly necessary, but it seems possible that when all larger transport-operating companies have their own pilots' schools they will be able to recruit comparatively inexperienced pilots, and, because they themselves have given the necessary training, will be justified in offering a lower scale of pay.

There is no reason to suppose that such a team of pilots would be any less safe or useful than those employed at the present moment, but one cannot help feeling that the effect would eventually be disastrous. Apart from the fact that the modern technique of transport flying demands a special mentality—neither over-brave nor over-cautious—which is found only through competition in which the prizes are comparatively large, the travelling public will also have a word to say about it. If they discover that their captain or commander is being paid, say, £300 a year, then they will feel either that they are not being conducted by the best of pilots or that the job is considered as being of little importance—in other words, perhaps, that their lives are of little importance.

At all costs the standard of efficiency and morale amongst transport pilots must be maintained and improved, and if it is known that the job not only offers little at the time but also that it leads nowhere, then the best type of pilot will certainly not be attracted. Luckily, the work of the professional pilot becomes yearly more difficult and more responsible, and the whole matter will probably work itself out automatically. The companies will find that they simply cannot carry on with the personnel which they are able to obtain at the lower rates. The operational department of any company may be important, but the people in it are useless and helpless without a team of first-class pilots.

In the air, seen from certain angles, the *Graf Zeppelin* presents the foreshortened appearance typical of large airships.

A Description, from Actual Inspection, of the Constructional Features and Accommodation of Germany's Latest Dirigible—

"GRAF ZEPPELIN"

NOW that initial test flights have been successfully completed, it becomes permissible to describe constructional features of the LZ 130 (the new *Graf Zeppelin*) inspected by *Flight* during a visit for the purpose to the Zeppelin works at *Friedrichshafen*.

The story of the building of this ship, like that of the Zeppelin Company itself, is one of appalling setbacks. In the first instance the ship was intended to be more or less a duplicate of the LZ 129 (*Hindenburg*), which was destroyed by fire at Lakehurst, New Jersey, on May 6, 1937, and work was started as soon as the hangar at Friedrichshafen was vacated by her ill-fated forerunner. She was to have been completed by the latter part of last year, making way for the LZ 131 and LZ 132, of similar design but with increased accommodation. The destruction of the *Hindenburg*, however, gave rise to a great outcry against the employment of hydrogen as the lifting gas and she was modified to allow for the use of helium.

When *Flight* visited the works about six months ago the structure was virtually complete, though work had barely begun on the living quarters. That almost inspired confidence which has always characterised the Zeppelin staff was still very much in evidence and everyone was looking forward to showing the world what the new ship could do, despite the technical disadvantages attendant upon the use of helium.

Then came another hammer-blow. The licence to export helium from America was retracted. After some months of fruitless negotiations it was decided to fill the ship with hydrogen and to use her as a freighter until such times as helium shall be forthcoming. The *Graf Zeppelin* is now making trial flights.

It was possible at the time of *Flight's* visit to obtain not only a good idea of what the finished ship would be like in her passenger-carrying form, but to collect some interesting information relative to the structure.

Built to a fineness ratio of 6:1, the new ship has 15 main frames, wire-braced and trussed with king-posts. These are interspersed with secondary frames without wire-bracing and linked by 36 longitudinals. All the structural girders are triangular in section and are used in three sizes, depending on the length and strength required. The largest, with corner booms of modified Omega section, are for the main rings; the second size is for the intermediate rings and longitudinals; and the smallest size is used largely for other longitudinals. The material is a special tough duralumin and has a blue anti-corrosion finish. In some places seven or more girders converge on one point and it is necessary for the workmen to be supplied with models of the joint, for drawings would be quite unreadable.

A keel, picking up on the four bottom longitudinals and embodying a servicing gangway, extends for the length of the hull.

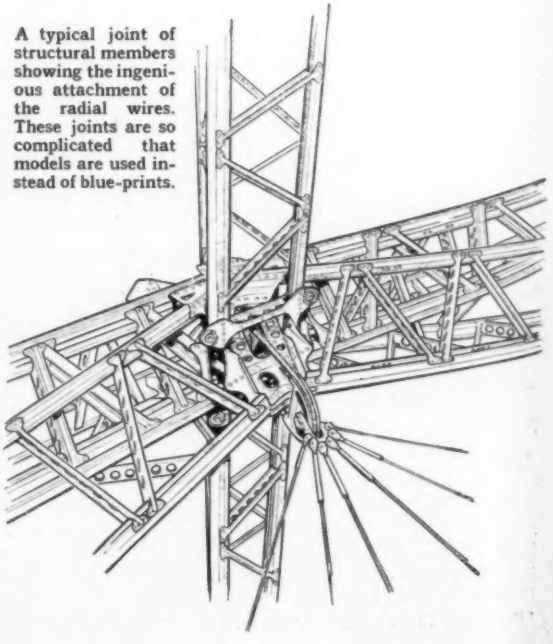
The wire-bracing system is best understood by reference to the accompanying drawings.

Between each pair of main ring frames is a gas bag, which means that there are sixteen in all. These bags are of circular section with a central tunnel for the cat-walk and are made of a special cotton fabric treated with synthetic film after a process evolved by the Balloon Section of the Zeppelin Company. They are kept under control by the radial wires and, if one is emptied, these wires will take the load of the next bag. The bags are inserted from the bottom of the ship, being lifted and inflated simultaneously. Each has its own gas release valve discharging into a common tunnel between each pair of bags. When gas is not being valved it is possible to climb up these gas shafts.

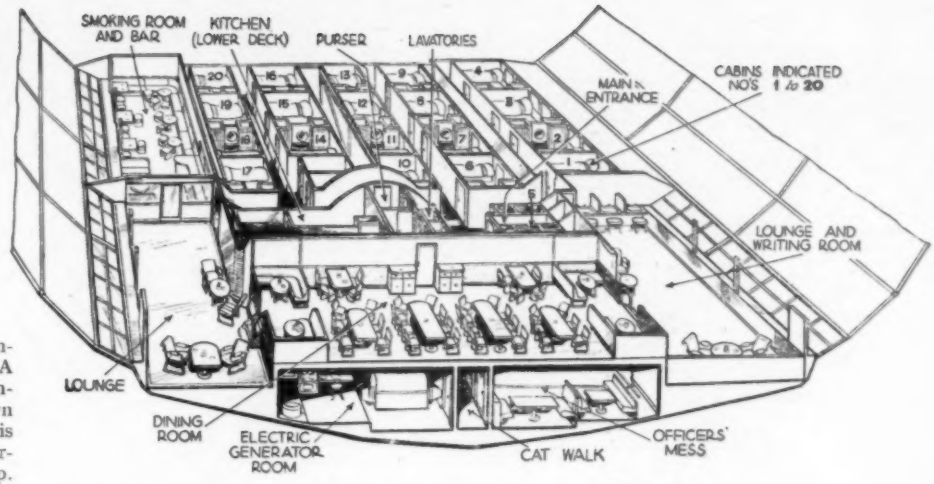
The semi-cantilever tail is built on the standard Zeppelin cruciform lines and is tremendously stiff. A single wire braces each of the fixed surfaces. All control surfaces are aerodynamically balanced and are operated from the forward control car by an electrical servo system.

The lower fin houses an emergency manually operated steering gear and carries a swivelling landing wheel. At every landing this post is manned by two men.

The fabric used to cover the greater part of the ship is a strong cotton material laced on and doped with cellu-



A typical joint of structural members showing the ingenious attachment of the radial wires. These joints are so complicated that models are used instead of blue-prints.



A self-explanatory exposition of the *Graf Zeppelin's* accommodation, spread over two decks.

lose, but hemp is employed on the fins. A ridge to prevent rainwater running down into the windows is built round the forward end of the ship.

The four Daimler-Benz sixteen-cylinder water-cooled heavy-oil engines give 800 h.p. each for continuous cruising and are of the type used in the *Hindenburg*; they are carried in gondolas some way outboard from the keel structure. The gondolas are sufficiently large to permit mechanics to work on the engines in flight. Apparatus for recovering water from the exhaust gases is installed.

Details of this new water-recovery system are not available, but it may be said that the equipment, with the necessary coolers, is housed in the engine gondolas, necessitating tractor airscrews instead of propellers.

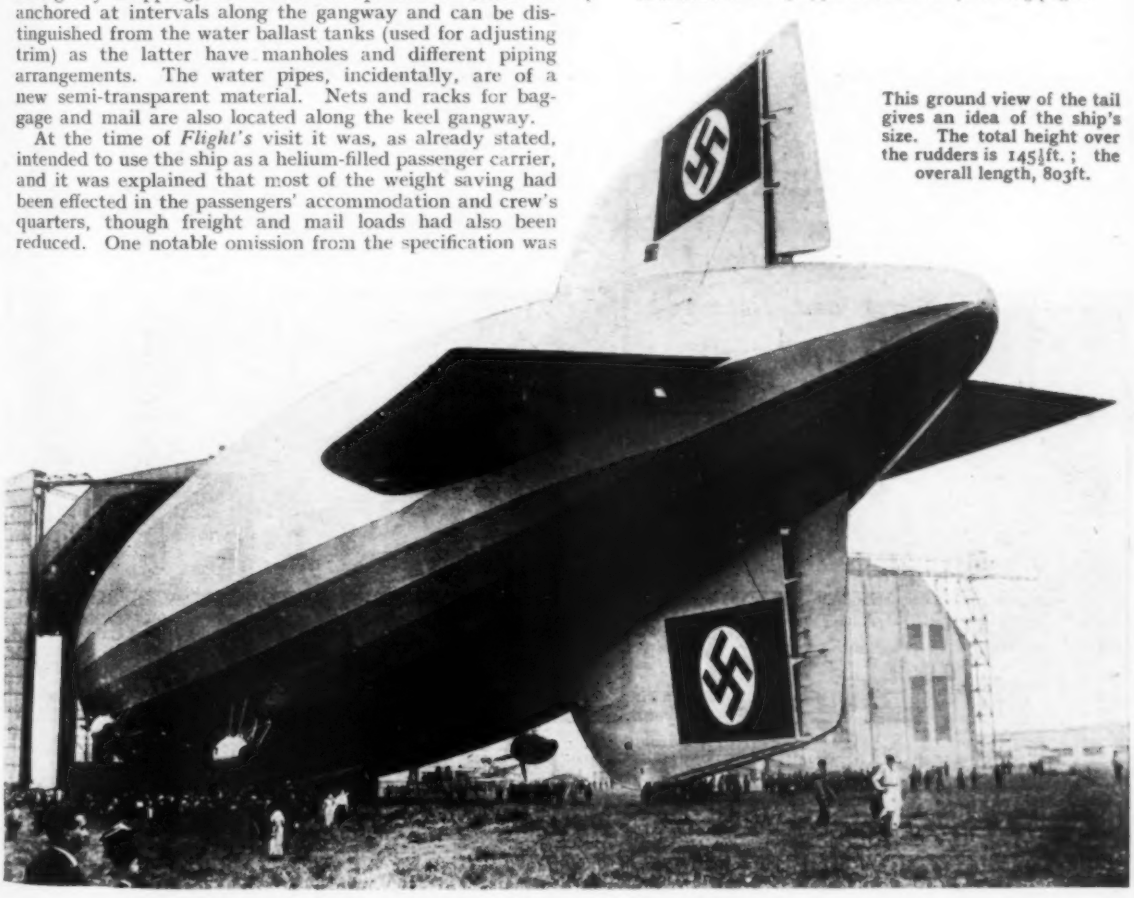
About fifty metric tons of fuel oil are carried in interconnected cylindrical tanks, some with provision for emergency dropping, others with dump valves. These are anchored at intervals along the gangway and can be distinguished from the water ballast tanks (used for adjusting trim) as the latter have manholes and different piping arrangements. The water pipes, incidentally, are of a new semi-transparent material. Nets and racks for baggage and mail are also located along the keel gangway.

At the time of *Flight's* visit it was, as already stated, intended to use the ship as a helium-filled passenger carrier, and it was explained that most of the weight saving had been effected in the passengers' accommodation and crew's quarters, though freight and mail loads had also been reduced. One notable omission from the specification was the famous piano, which shortened many an hour on the South American run in the *Hindenburg*.

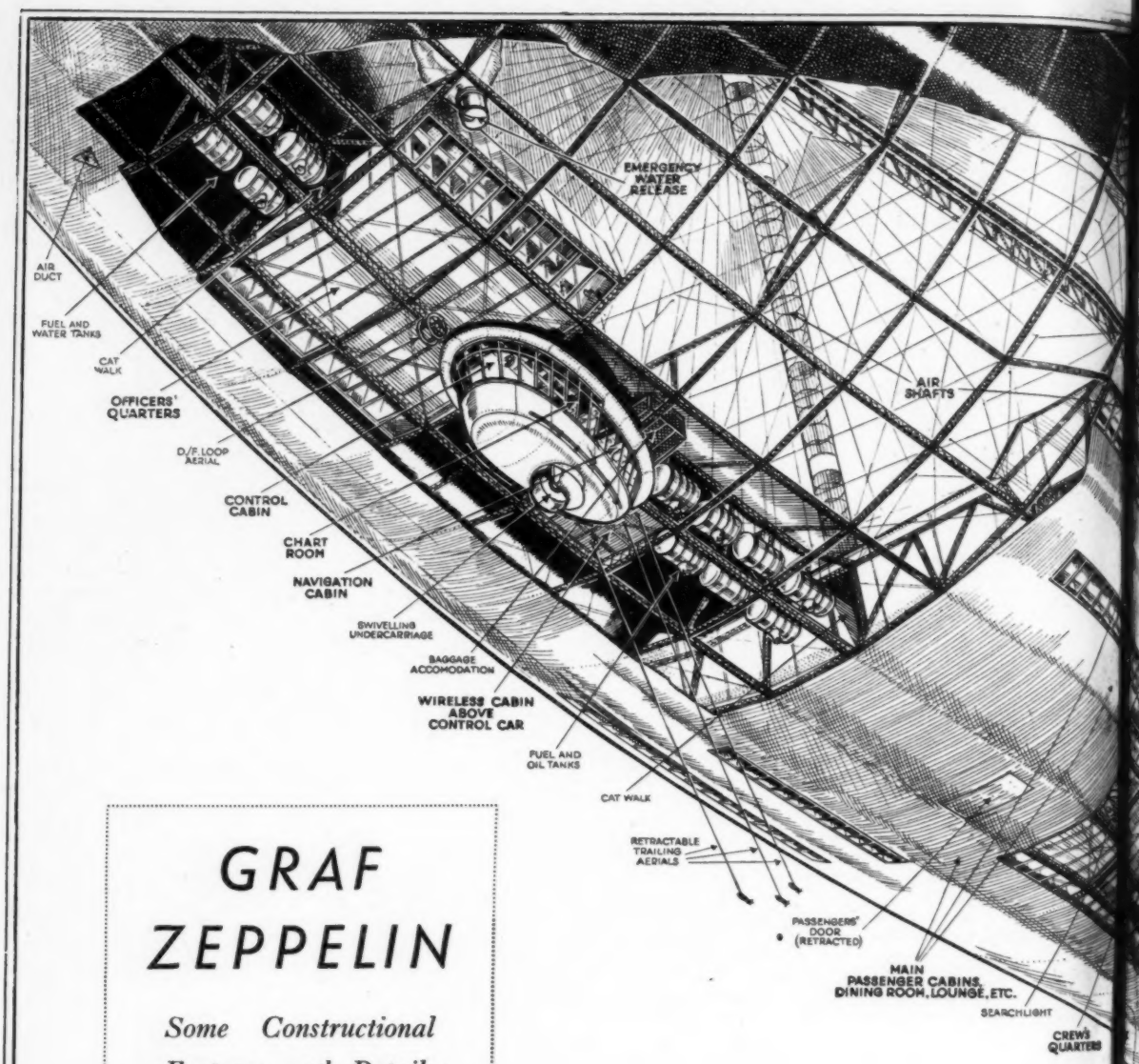
The provisional passenger accommodation, details of which are apparent in Max Millar's cut-away drawing on overleaf, is located in between two main rings and provides for only forty persons against the *Hindenburg's* fifty. The cabins are arranged as indicated in the plan view and are fed by air-conditioning plant.

The control car is a duplicate of that installed in the *Hindenburg* and accommodates all the usual engine signals, temperature gauges, ballast indicators and control valves.

A detailed drawing appears on the two following pages.

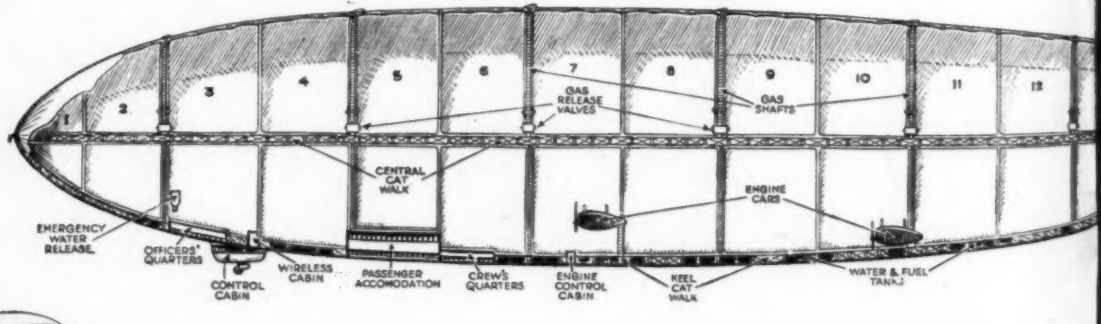


This ground view of the tail gives an idea of the ship's size. The total height over the rudders is 145½ft.; the overall length, 803ft.



GRAF ZEPPELIN

Some Constructional Features and Details of the Equipment



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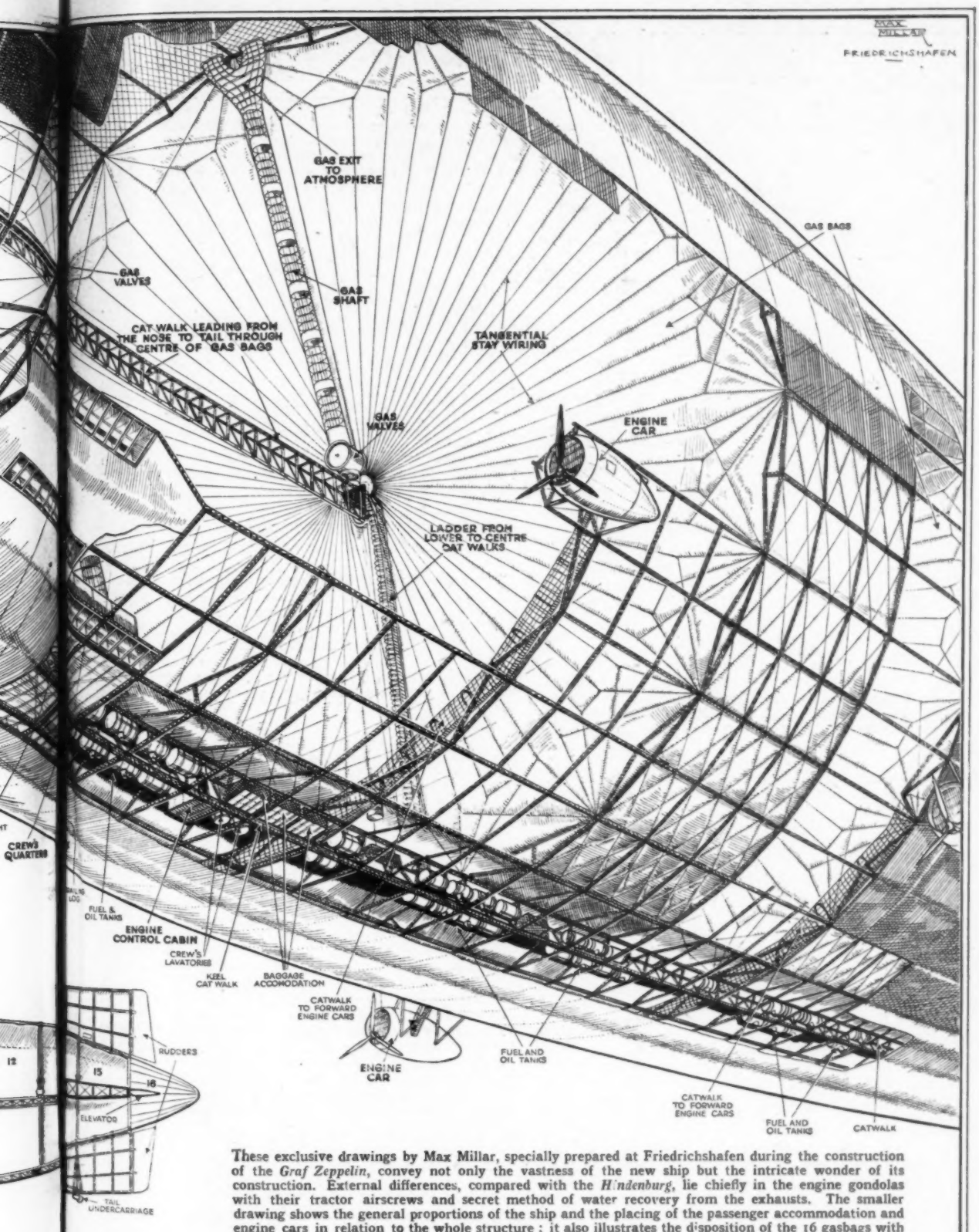
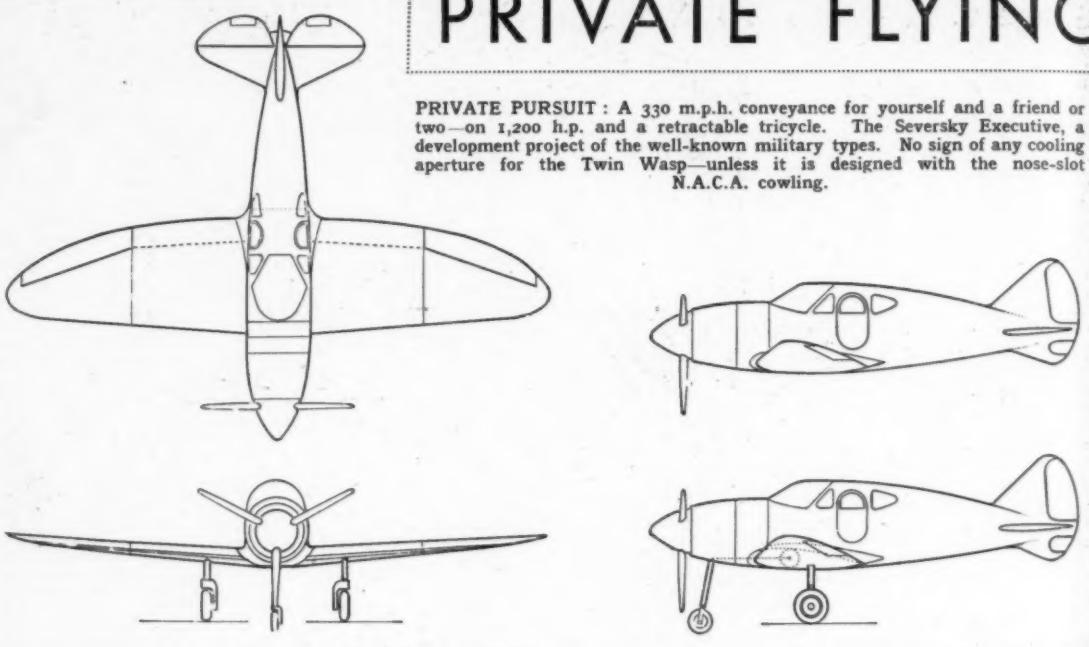


These exclusive drawings by Max Millar, specially prepared at Friedrichshafen during the construction of the *Graf Zeppelin*, convey not only the vastness of the new ship but the intricate wonder of its construction. External differences, compared with the *Hindenburg*, lie chiefly in the engine gondolas with their tractor airscrews and secret method of water recovery from the exhausts. The smaller drawing shows the general proportions of the ship and the placing of the passenger accommodation and engine cars in relation to the whole structure ; it also illustrates the disposition of the 16 gasbags with a central cat-walk running through them.

PRIVATE FLYING



PRIVATE PURSUIT : A 330 m.p.h. conveyance for yourself and a friend or two—on 1,200 h.p. and a retractable tricycle. The Seversky Executive, a development project of the well-known military types. No sign of any cooling aperture for the Twin Wasp—unless it is designed with the nose-slot N.A.C.A. cowling.

Topics of the Day

Official Tricycles?

A WEEK or two ago I inferred that I had seen the light in the matter of this C.A.G. scheme. This still dim light was unofficial and was merely the result of a discussion with somebody quite outside the aviation business. The idea that the scheme can be considered simply and solely as a boost for aviation in general was the result of a little intelligent consideration.

Possibly this idea of advertising flying was the smallest of small germs in the minds of those who proposed the scheme, and they will probably deny that any such thought had crossed their minds. But without it I still think that the scheme has so many points of criticism that it is of doubtful value, and I can only imagine that the sponsors, once they have seen the degree of support, will extend the number of hours permitted and give trained pilots some more encouragement to carry on with the good work.

The unofficial attitude (according to my spies) of the Air Ministry towards the use of the tricycle type of undercarriage in C.A.G. training certainly gives, at first glance, some support to the boost theory. It appears that they, like the American constructors, are all out for this form of gear, and it is likely that all new Service and civil specifications will incorporate it—at least as an alternative.

Even so, it will be many years before every machine is so fitted in the ordinary course of events, and the man or woman who has been trained on the tricycle may not be capable of dealing with a machine fitted with a conventional type of undercarriage. Obviously, therefore, if my spies are right and the Ministry *is* in favour of the use of the tricycle for primary C.A.G. training, while their desire to get as many people as possible into the air is the only one behind the scheme, then there must be something more in the use of this undercarriage than the critics will admit.

Brighter Training

IN my early training I was put on to do landings and take-offs long before I was really capable of flying a machine safely about the sky. Thereafter, these landings and take-offs were merely the beginnings and ends of practice circuits—which were entirely necessary to accustom me to flying as such.

The good effects of this practice flying were, however, to some extent negatived by my worry at the beginning and the end of each round. For minutes after a weavy take-off I was still very shaken, and during the whole of the last part of each approach I tended to stare glassy-eyed at the spot on which I hoped to make a reasonably fair three-point landing. Hardly at any time during the period was it possible to look around and enjoy flying with a free mind.

The tricycle will at least help to remove the tenseness and the unnatural concentration of early flying, and the pupil will probably be a better "airman" because of it. Later on, when he has become thoroughly accustomed to the new medium and to the handling of a vehicle moving in three axes, he will also, in all probability, be a better all-round pilot.

At the moment he must, so to speak, attack all the problems together after, at the most, three hours in the air, and this effect may altogether prolong the period of actual dual, as well as that during which he is a somewhat shaky soloist. One can learn to fly an aeroplane in the air in the matter of an hour or two, but the judgment of approaches and of landings can take practically any period of time according to the ability of the pupil. Some pilots I know have, after hundreds of hours, never learned either to make a really good landing or to make an accurate approach—and it is surprising indeed that anybody ever does learn to do either of these things properly.

Nevertheless, the inapt pupils often turn out to be the safest of them all, for the simple reason that they are conscious of their faults and consequently take greater care throughout their flying life. I should imagine that the most dangerous pilot in the world is the man who is quite good and confident after perhaps five hours of dual instruction. He could not possibly have learnt all there is to learn, and the longer one is in the care of an experienced instructor the better it is for all concerned.

Spreading It Out

WHEN learning to land with the help of a tricycle undercarriage it is not that no judgment at all is required, but that the standard of accuracy need not be so high. The sort of landing which demands a second circuit, or even causes undercarriage failure in the course of a bungled recovery, would go unnoticed, but the instructor would see to it that the landings were not too bad and that one out

PRIVATE FLYING (CONTINUED)

of every three or four was definitely good. Nevertheless, knowing that everything did not depend on his actions during the last few unhappy seconds of an approach, the pupil would not be suffering the same agonies of anxiety as those involved in preparing for a normal three-pointer.

Very few people, once they have got past the difficult stage, remember very clearly the concentrated bother of early landing attempts. Not only must the approach be judged with a reasonable amount of accuracy, but the preliminary check must be started at more or less the right height above the ground, and this check must be reaching the point of actual hold-off within height limits of not more than two or three feet. In the meantime the machine is losing speed and the final backward movement of the stick must only be made when this useful speed has been finally lost. All the time, if the weather is in the least bumpy, the pupil must go through the normal corrective actions—which are not by any means instinctive until he has put in scores of hours.

At the end of, say, six hours with a tricycle undercarriage the pupil should be able to go solo and will then gain confidence while still being protected from the result of quite serious errors of judgment. For a matter of ten more hours he would still be learning something about flying an aeroplane, and all the time he would be accustoming himself to the judgment of heights, speeds and distances so that at the end of a total of, perhaps, twenty hours he would have no difficulty at all in pulling off a reasonable three-pointer after three or four rounds with an instructor in a conventional aeroplane. And he would have the confidence which is so extremely necessary in this flying business.

INDICATOR.

FROM the CLUBS and SCHOOLS

REDHILL

MESSRS. F. C. Mackenzie, D. F. R. Emus, J. K. Ross, J. P. Batcheldor, S. E. Saunders and R. J. Phillips have gone solo. Eight new members have joined the club. Last week 206 hr. were flown.

ABERDEEN

Twenty C.A.G. pupils have been enrolled and ten are already under instruction.

JOHANNESBURG

The club's flying time during September amounted to 658 hr. Five new pupils were enrolled and one obtained his "A" licence.

HULL

Over 100 hr. were flown during the past month. Four members of the C.A.G.—Messrs. Ford, Bell, Wellbourne and Mayfield—have gone solo.

PENANG

During September 99 hr. were flown by the club. Stormy weather was partly responsible for the small amount of flying done during the month. Mr. J. D. Lambert has passed his "A" licence tests.

SHOREHAM

C.A.G. members have done a great deal of flying recently, instructors being kept busy from 9 a.m. to sunset. Flying time for the week ending October 29 amounted to over 60 hr.

BROOKLANDS

During the last two weeks over 140 hr. were flown in spite of three blank days. Messrs. Harries and Longhurst have gone solo. Mr. B. S. Smallman has passed his "B" licence tests.

EDINBURGH

Sixteen consecutive days of high winds, together with bad weather, reduced the flying time for October to less than a third of normal. A total of 30 hr. was flown by club members, and 31 hr. by the C.A.G.

ROMFORD

Mr. G. Frappit and Miss P. Allen have gone solo, while Messrs. F. Fuller, F. Cooper, R. Keech and P. Jennings have passed their "A" licence tests. Over 133 hr. were flown during the last two weeks.

BENGAL

During September club machines flew over 100 hr. Messrs. G. Das, H. H. Marshall and the Raja of Katiary went on their first solo flights. The last named and Mr. D. A. Bruce have now passed their "A" licence tests.

NORWICH

In spite of fog and poor weather conditions C.A.G. members put in 70 hr. flying in the last two weeks. Mr. G. R. Gallant has obtained his "B" licence. Messrs. E. A. Redfern and L. Strauss have started instruction for their "A" licences.

HERTS AND ESSEX

Over 356 hr. were logged during October. Mrs. E. M. Gwillim has gone solo, while Mr. G. W. Foley has obtained his "A" licence. Messrs. A. J. O'Brien, W. Ross, A. J. Haynes, R. Egnell and R. E. C. Ebsworth have joined as new members.

STRATHTAY

Fog and poor weather conditions somewhat marred the club's flying time for October, which amounted to 70 hr. A new member is Mr. W. R. Jameson. Four C.A.G. members, Messrs. Mackay, Littlejohn, Crawford and Calderwood have gone solo.

LONDON

Mrs. M. G. Caldwell and Miss L. Dove have made their first solo flights and Messrs. Salmon, G. E. Richards, W. E. Robinson and Mrs. Hebden have completed their "A" licence tests. During the last two weeks 225 hr. were flown by the club. The chief instructor, Mr. J. A. Harris, who has been with the club since 1933, was married on October 29 to Miss Joan Ford.

NORTHAMPTON

On Friday, November 4, the annual tramps' party and firework display was held. New members include Miss V. Mann, Mrs. Russell, and Messrs. F. D. Ward and P. L. C. Davis. Forty C.A.G. members have been selected for training.

C.A.S.C.

On November 24 the Corps first dance of the season will be held at the First Avenue Hotel, Holborn. Messrs. Marsh and Anderson have now gone solo. In spite of bad visibility, members flew 12 hr. during last week. The Corps has obtained the use of a Gipsy I Moth.

YORKSHIRE

But for adverse weather the flying time for October would have been much greater. As it was 204 hr. were flown. The club has now taken delivery of a new Tipsy, bringing the club fleet of machines up to eleven. One hundred and fifty C.A.G. members are now receiving instruction.

MARSHALL'S

A total of 191 hr were flown during the last two weeks by the club. Mr. Clapin went solo, while Mr. Hewlett has obtained his "B" licence. Messrs. R. G. Bowles, L. D. Roper, Anderson, March, White and the Misses Canning and Roper—all C.A.G. members—have now gone solo.

BEDFORD

Messrs. J. J. Gallagher, E. W. Wilbur, R. M. Dixon and M. J. Tyssen have now obtained their "A" licences. Messrs. J. E. Marshall and C. Carmichael have gone solo and Messrs. H. G. Stephenson and R. S. V. Priest have joined as new members. Over 301 hr. were flown by the club during October.

CINQUE PORTS

Over 101 hr. were flown by the club during the last two weeks. Messrs. R. Giles, R. Wing, A. Bacon, A. Jordan and A. J. Howard—five C.A.G. members—have gone solo. Mr. J. H. Stigner has obtained his "A" licence, while Mr. R. Goodall, a C.A.G. member, has also obtained his licence. Mr. J. A. M. DuPert has returned from an absence abroad of three months duration.

NORTHERN AVIATION

During the month of October the club flew 150 hr. Of 1,500 applications for the C.A.G., 150 have been accepted and a further 50 are attending lectures. Messrs. W. Gunn, E. B. Terry, F. G. Stewart, D. D. Stone, J. D. Shamrock, J.B. Hancock, A. W. Wilson, R. Worth, J. B. Russell and F. Hartley have gone solo, while Messrs. C. M. Jones, H. Walker and C. H. Deane have obtained their "A" licences.

NEWCASTLE-ON-TYNE

On October 16 officers of the 63rd (Anti-Aircraft, T.A.) Brigade were given flights and entertained at an informal party. Members of the C.A.G. flew 116 hr. during the last two weeks. For the same period the club flying time amounted to 102 hr. Messrs. T. T. Davidson, G. E. Jackson, R. Forsyth and A. S. Wallace were among the first C.A.G. members to go solo. The annual dinner and dance will be held on December 9, at the Station Hotel, Newcastle-on-Tyne.

WITNEY AND OXFORD

Thirty C.A.G. pupils are now under instruction with the Witney and Oxford Aero Club, which is run as part of the training school of Whitney Aerodrome, Ltd., of which the directors are Mrs. B. S. Macdonald and Mr. E. B. Taylor. Among these C.A.G. pupils, first solos have already been made. Messrs. R. M. Dryden, H. G. Harris, L. E. King and Mervyn Thomas have passed their "A" licence tests. In the normal section Miss Mary Wilkins and Miss D. Sorour have passed their "A" licence tests and Sir James Walker, Bart., and Mr. G. Benge have gone solo. During September the club put in a total of 192 hr. 10 min. flying, and for last month the total was 153 hr. A B.A. Swallow has been added to the club fleet.

COMMERCIAL AVIATION

"Flight" photograph.

READY FOR ACTION : The first of the passenger-carrying D.H. Albatross monoplanes at Croydon last week. Suitably posed in the background will be seen *Heracles*, which has done so much good work and which will still be essential for dealing with the tremendous mail loads on the Empire routes during the Christmas season. Two of the D.H. Frobisher class are expected to be ready before the middle of December ; afterwards they will be put on the Zurich route.

IMPERIAL AIRWAYS are having a tremendous time with the Empire Christmas mails. Every available aeroplane is being pressed into service, I am told, and a great deal of sub-chartering is being done—thus bringing grist to other chaps' mills. *Heracles* and *Scylla* are having extra fuel tanks fitted, and nobody gives a hoot for jealous shipowners who say that they can equal the speed of these veterans by putting an extra knob or so of coal on their ships' fires.

THE WEEK AT CROYDON

While in Search of Transport Wisdom "A.Viator" Studies All-up Mail Effects, Bad-weather Approach Psychology (with Obstructions), and the De-icing Question

Mercury, they say, is to do non-stop flights with mails to Egypt, whilst *Maia* does the odd feeder service from Southampton to Marseilles. Five Ensigns will be delivered, it is hoped, by November 24—two for the Paris line and three for Empire mail work—and before December 17 two of the D.H. Frobisher class are expected. These will go on the Swiss route.

It is even rumoured at Croydon that such craft as the International Air Freight Condors, specially fitted for freight carrying, but at present "resting," as well as Lord Forbes' private D.C.1, the prototype Douglas and the only one of its type in existence, may be seen busily flying to and fro with Empire mails.

This huge mail-carrying business will, I venture to think, do a great deal to remove from the public mind the vague, lingering suspicion that air transport is a rakish, swash-buckling affair, not altogether as staid and respectable as the bewhiskered Victorian railways or the portly and rubicund shipping business.

It will be interesting, by the way, to see what effect the extensive carriage of parcel post by air will have on the air freight business. Once the world gets the air parcel mail habit, air freight should benefit enormously, because as soon as confirmed parcel-post users want to send something a bit bulkier or heavier than the post office will accept (their weight limit being 11 lb.), they will automatically use air freight. A lot of business is blind, unthinking habit, and already some freight which might just as well go by more leisurely means is being sent by air. Packing costs by air are very much less, of course, because air people do not practice putting the weight, tossing the caber, or any other ham-handed antic-hay with their clients' fragile or perishable goods. There is also the question of lower insurance on the more trustworthy air lines, and the absence of that curse of docks and railroad depots—pilferage. Anyway, I see quite a bright future for the air freight business within the next few years.

Two important special charter machines left Croydon last week. The first was a D.C.3, and the second a D.C.2, both of the K.L.M. fleet and both bound for Bombay. H.H. the Maharaja of Baroda was lying seriously ill in India, and once again the commercial aeroplane provided the swiftest means of transport in an emergency. The first machine, which left at 8.30 a.m. on Friday morning, contained H.H. the Maharanee of Baroda, accompanied by H.H. the Maharanee of Cooch Behar, and the second machine, which left at dawn on Saturday, had as its sole passenger an eminent Harley Street specialist.

The D.C.3 which left on Friday made Naples the first day, Basra the second, and Bombay early on the Sunday afternoon.

Gen. Franco's special representative in this country, the Duke of Alba and Berwick, left Croydon by Sabena during the week for Brussels on a visit of no political significance, as he informed the Press representative before leaving. I am always intrigued by the title "—— and Berwick," to the explanation of which I have no clue. Englishmen often lay claim to castles in Spain, but it is new to hear of a Spanish grandee with a castle in Scotland.

Last week's controversy about landing or not landing in fog continued to rage in various newspapers for days. The truth is that what looks very alarming from ground-level, or from the control-tower window, is frequently plain sailing from the pilots' point of view. Many a time have experienced people misjudged the situation from the ground when they have heard, but not seen, a machine passing fairly close over the centre of the landing ground. The pilot who is looking down through the fog instead of up through it towards the sun has had quite good vertical visibility.

That is why, in such circumstances, most managers advise pilots what to do instead of instructing them. An experienced commercial pilot, having had all the weather reports and being above the aerodrome (where he can judge the real landing conditions better than anyone else) should be able to make the wisest decision in the circumstances.

Last-minute conditions, including those pertaining to horizontal visibility, are always difficult for the pilot to judge, however, and it is not long since a machine was

COMMERCIAL AVIATION (CONTINUED)

damaged owing to the fact that ground fog suddenly thickened to a solid mass as the pilot was approaching. It formed, they say, a level bank some 30ft. above ground, and the pilot landed on it instead of on the ground. Unhappily, it was not so solid as it seemed, and he went through.

This may be a good time (post early for Christmas) for a Yuletide message to the department concerned with the erection of unnecessary pylons around airports. The message is: "Merry Christmas, stop, don't do it," for there would not be the difficulty and bother that there is about fog landings if Croydon, for example, was not infested with dangerous obstructions, many of which have been erected apparently for fun, and most of which could have been abolished or their construction banned.

Taking everything into consideration, and presuming, somewhat presumptuously, to know something more about the matter than the average daily paper wizard, the opinion I have formed is that you may as well leave the decision to the man at the wheel, who knows his job and is aware of his responsibilities both to his passengers and to the owners.

Another Balloon Area

ANOTHER danger area concerned with balloon barrage practice has been established at Stanmore. Pilots are advised to fly at an altitude of not less than 6,000ft. over this area, which is bounded by straight lines joining Brockley Hill (Elstree), Stanmore railway station, Pinner railway station, and then by the railway line to a point one mile east of Rickmansworth, along the Grand Junction Canal to the main road intersection two miles north-west of Watford, and, finally, by the Watford By-pass road back to Brockley Hill. Details are given in *Notice to Airmen, No.* 248.

The Jersey Accident

AFTER a remarkably good record during their five years of existence, Jersey Airways suffered, last Friday, an accident at Jersey Airport in which fourteen were killed, including the pilot, F/O. A. G. M. Cary, and the radio operator, Mr. R. J. Lyons.

The machine, one of Jersey's D.H.86s, had taken off on the ordinary service, which was duplicated, and following another machine. It made a circuit of the aerodrome, entered the low cloud, and a moment later appeared again in a steep dive, striking the ground beyond the eastern boundary of the aerodrome. The radio operator had already sent a message in the usual departure form, saying that the machine was climbing through the cloud, and eye witnesses state that the engines were running until the moment of impact.

At present, and until the findings of the official Air Ministry enquiry are published, it can only be supposed that, for one reason or another, the machine was accidentally stalled. At the time of the accident visibility was about 4,000 yd. and the cloud height was 150ft.—quite reasonable conditions for present-day operations.

Azores Survey

FOLLOWING Capt. Entwistle's paper on Atlantic meteorological problems, read before the R.Ae.S. last Thursday, it is particularly interesting to learn that Capt. G. I. Thomson, D.F.C., an Imperial Airways pilot, has now completed a year's survey of the Azores region.

The islands, as might be expected, present considerable geographical difficulties in the matter both of airport and flying-boat base selection, but Capt. Thomson has recommended that the southern route should be seriously considered as an alternative one for winter operation. He suggests that, with the co-operation of the Portuguese meteorological and radio services, a series of experimental flights can usefully be carried out.

During the year he visited each of the nine islands making up the group, surveyed alternative aerodrome sites, and made daily observations of local flying-boat conditions. In addition, the Portuguese meteorological department at Horta offered daily records of cloud height, visibility, wind direction and speed, rainfall and tidal currents, and Capt. Thomson's reports also deal with the D/F facilities which would be available for experimental work.

Interesting experiments have been in progress at Smithfield, where the refrigerating plant has been used for experiments with an improved form of Kilfrost.

The use of this material as a de-icer has been officially approved by the Air Ministry, and it will therefore be used regularly in future by Imperial Airways. Considerable excitement was caused, according to my special Smithfield correspondent, because an official who was watching the tests forgot his winter vest and became completely gelid. In this condition he was accidentally hung up by the heels with a row of prime Christmas turkeys.

"At present," said an official late last night, "the process of thawing out our Mr. Postlethwistle is very slow, especially from the collar studs (back and front) upwards. He has been temporarily accommodated bolt upright in the department's umbrella stand, but this we regard here as a passing phase. Nobody," continued the official, "will have such a vast practical experience of ice accretion as our Mr. Postlethwistle when he wakes, and we feel that somehow or other the incident will ultimately benefit science, whatever the permanent effect may be on our Mr. Postlethwistle."

A. VIATOR.

Imperial Profits

AT the fourteenth annual general meeting of Imperial Airways, the figures given for the year which ended on March 31 last showed a decrease in profit, from £356,206 of the previous year, to £299,623. It appears that the company had not, in the period under review, adjusted itself to the conditions of the new mail contracts, which had been, at the end of the financial year, only in operation for nine months on the African section of the Empire routes and for one month on the Indian route.

The traffic, however, showed an increase in ton-miles of more than 60 per cent., though the figures on the European services were only maintained. The latter is explained in the report as being caused by "the continued and deplorable delay in delivery of the new landplane fleet through circumstances over which the company had no control."

"*Flight*" *photograph.*

NEARLY READY: The new Imperial Airways London terminal as it now appears. In this photograph the Buckingham Palace Road frontage is shown, with Victoria Station behind.

COMMERCIAL AVIATION (CONTINUED)

Practical Exposition

AT the Working Men's College, Capt. Laurence Pritchard is speaking to-night on "Military Aviation." Next week, on Thursday, November 17, a representative of British Airways is lecturing at 8 p.m. on "Civil Aviation." The College is in Crowndale Road, London, N.W.1.

A "Clearance" Altimeter

FOR a very long time pilots have looked forward to the development of some device which would tell them their height, not above starting point, but above the ground over which they were actually flying. Such a "clearance" altimeter, it appears, has now been made and an example is being tested in service with United Air Lines, one of whose engineers, with the Western Electric Company, was responsible for it. In due course the instrument will be made available to the industry generally.

The system used involves the transmission of a radio signal towards the earth, the reception of the consequent reflection of the signal, and the measurement of the elapsed time between the transmission and the reception. This time is, of course, translated into a direct reading of altitude in feet. Except for the fact that (for directive reasons) the equipment makes use of the shortest wavelength ever applied to commercial purposes, and that it will weigh about 25lb. in production form, very little information is yet available.

The altimeter can be directed at any angle so that the pilot is not necessarily being told only that he is at a safe height above the ground immediately below, but also whether he is approaching higher ground.

Flamingo Figures

CAPABLE of carrying up to twenty passengers on short hauls, the D.H. 95, or Flamingo, all-metal transport, which is now almost completed at Hatfield, may be generally described as a twelve-seventeen seater, since its normal function will naturally be on the longer international routes. The cabin has a maximum width of 7ft. 4in., but the width decreases very little, being 7ft. 1in. by the rear door. Transverse rows of three instantly adjustable arm-chairs are arranged—two to the right and one to the left, of the aisle. Headroom ranges from about 6ft. 6in. to 6ft. 2in., and the saloon is 16ft. long.

In the twelve-passenger scheme there is a spacious toilet on the starboard side at the rear, and behind, accessible through a door from the cabin as well as from outside, there is a luggage hold of 150 cu. ft. In addition there is a mail hold of 25 cu. ft. and a freight hold of 55 cu. ft. under the pilot's cockpit. The seventeen-passenger scheme allows for the same type of adjustable armchairs with a cabin length of about 19ft. 2in., but with a smaller toilet compartment and a rear luggage room of 98 cu. ft. The twenty-passenger scheme utilises about 21ft. 8in. of length and allows for a full-width compartment at the back, which may be furnished as a toilet or luggage hold. The front mail and freight holds are retained in every scheme.

In the D.H. 95 prototype shop at Hatfield preparations are being made, night and day, for the final fitting of the main plane extensions, while elsewhere in the factory rows of steel jigs for quantity production are being erected.

Projected Services

DURING the past two years a number of interesting applications for air line extensions have been submitted to the Ministry of Communications in Egypt. These may be considered as future projects, and a month or two ago were still under consideration.

In January, 1937, for instance, K.L.M. applied for permission to fly from Amsterdam to Cairo; D.L.H. applied during the following month for permission to fly, as a continuance of the Berlin-Baghdad route, from Baghdad to Cairo and Khartum; an unnamed American company (presumably Export Airlines) asked, on December 1, for permission to make eight trips to Cairo; the Greek Air Traffic Company asked in January this year to be allowed to run a service from Athens to Cairo; and, finally, Polish L.O.T., in April this year, asked permission to extend their Warsaw-Palestine service to Alexandria.

Guilding the Association

ALTHOUGH there are essential differences in the aims and constitutions of the Guild of Air Pilots and the British Air Line Pilots' Association, it is undoubtedly a fact that the members of each would prefer to come to some working agreement. Certainly the court of the Guild has always wished to come to such an agreement, and both have recently published the form of such a possible arrangement.

The essential difference between the two bodies is simply that B.A.L.P.A. wishes to use the power of collective bargaining to obtain its members' rights, whereas the Guild is constitutionally debarred from giving its support to any object which might involve it in a conflict between employer and employee. The structure of the proposed agreement appears to give nothing away on either side, and it necessitates no change in the constitution of either the Guild or the Association—each organisation maintaining freedom of action.

The features of the agreement are as follows:—

1. The appointment of a standing joint committee of four representatives of each body.
2. This committee will work on a basis in which each party will be ready to collaborate within the limits of their respective constitutions. The general distribution of the activities is that B.A.L.P.A. shall deal with terms and condition of employment, while other questions will be dealt with by the G.A.P.A.N. Co-operation between the two parties will be a primary consideration in any matter.
3. The fullest possible support shall be mutually given by each party in all matters affecting the pilots' profession, and the function of the committee shall be to decide which matters shall be dealt with separately by one party or the other, and which jointly.
4. Neither party shall be bound by the opinion of the other in the event of any disagreement, and each shall be at liberty to take any steps which it may think fit.
5. Any approved action may be varied from time to time, and in the event of disagreement either party shall be at liberty to assume complete freedom of action.
6. The Guild will lease office accommodation to the Association at a nominal rent.
7. Either party can terminate this agreement by three months' notice.

MODERN FORMULA: There appears to be a tendency even in the U.S. to return to the high-wing layout which has always been favoured over here. This photograph of a model gives a good idea of the lines of the new D.H. 95 all-metal medium-capacity civil machine, which should be making its first test flights early next year.

COMMERCIAL AVIATION (CONTINUED) : WORLD NEWS

Over-water Popularity

APART from the London-Paris service no European airline carries more passengers than on that operated between Copenhagen and Malmö, which are separated by a comparatively narrow, but nevertheless troublesome strip of Baltic. According to a recently published statement by D.D.L., the Danish operating company, 8,530 passengers were carried between these two points during July and August alone.

Schiphol's Future

SOME time ago it was learnt that there was a possibility that the Netherlands Government might take over Schiphol airport for military purposes and that another central airport would be laid out elsewhere. This original idea has now, it seems, been passed over, and the Government, in answer to protests, has agreed that Schiphol itself shall be Holland's central airport.

Nevertheless, the problem has not been finally settled and both Rotterdam and The Hague are now in opposition. This opposition is shared by the managing director of K.L.M., Mr. Plesman, who does not agree that the "centralisation" of Schiphol will solve the problem. K.L.M. will still need to satisfy their customers in Rotterdam—so that there will be no concentration of traffic.

A few months ago it was also stated that Rotterdam Airport at Waalhaven would be taken over by the Government for military purposes and that Rotterdam would establish a new airport with State support. It appears that the Government has decided not to go ahead with this scheme and, since Schiphol is to remain a civil airport also, the present position is far from clear.

The Melbourne Accident

THE disaster involving the Australian National Airways Douglas D.C.2 on October 25 was not only the first accident to one of the modern American types which are now flying on most of Australia's main routes, but also the worst in the history of Australian civil aviation. Altogether eighteen lives were lost, including that of a former Commonwealth Minister for Commerce.

The machine was on the Adelaide-Melbourne service and the pilot had apparently covered the last part of the route while flying over low clouds or fog. He overshot Essendon aerodrome and flew into Mount Dandenong, which is twenty-four miles to the east of the city.

It may be remembered that a scheme is being developed by which all the major aerodromes in Australia shall be equipped with ultra-short-wave radio beacons. These will not only act in their normal approach-assistance guise, but will also be used for more general navigation. At the time of the accident none of these short-wave beacons was in action, since it was decided that none would be used until all ten of those ordered had been installed. The Essendon transmitter has apparently been ready for the past eighteen months, but the Defence Department had not tested it. It is reasonable to suppose that had the ultra-short-wave beacon been available for use the pilot of the Douglas would not have made the slight error in the radio navigation which caused the disaster.

Re-equipping Australia

AFTER operating their services with Dragons since they obtained the mail contract three years ago, MacRobertson-Miller Aviation are now about to take delivery of two Lockheed Electras. These machines will, of course, be used on the company's 2,300-mile route between Darwin and Perth in Western Australia, and are expected to be in service before the new year.

The Electras are fitted with Pratt and Whitney Wasp Junior engines and will, therefore, have a cruising speed of 190 m.p.h. and a non-stop range of nearly 900 miles. With such machines it should be possible for MacRobertson Miller to speed up their present schedule very considerably.

D.C.4 Performance

THE Douglas D.C.4 has, seemingly, in the course of some forty-six test flights, exceeded its predicted performance by a very fair margin.

During these tests, in which full power was not available, the guaranteed maximum of 240 m.p.h. was exceeded by a comfortable margin. Additionally, the rate of climb was more than 1,000ft./min. at 8,000ft., while 25,000ft. was obtained with full load and 20,000ft. when using only three engines.

Again with three engines, the rate of climb at 8,000ft. was still 580ft./min. On two engines (both on one side) the machine reached a height of 11,000ft., with a rate of climb of 100ft./min. at 9,000ft. instead of the guaranteed 10ft./min. The take-off run was 1,050ft. for an all-up weight of 61,200 lb. and it is expected that this will be considerably bettered in due course. It is said, too, that the fuel dumping tests have been equally successful.

Within a week or two the C.A.A. will grant the D.C.4 its certificates, and then each one of the five contracting airline companies will have the use of the machine for a specified period.

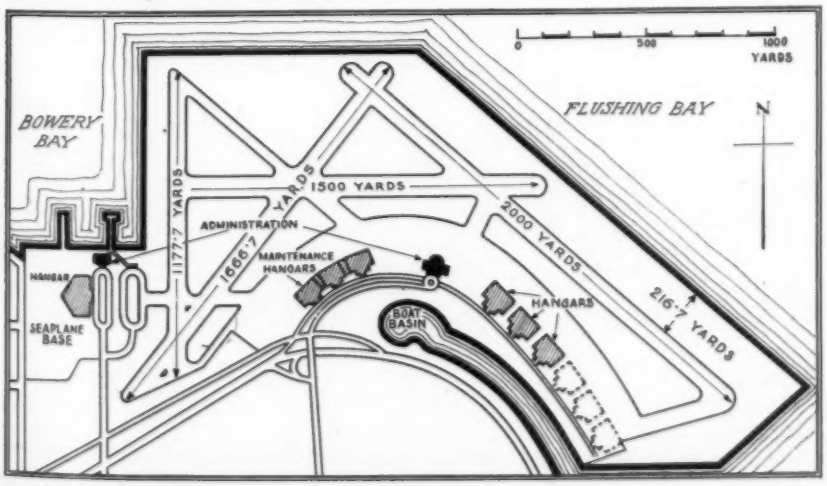
And Now Montreal-Winnipeg

AFTER preliminary experimental flights on the Montreal-Winnipeg extension of the trans-Canada air line service, an inaugural load-carrying flight was made on October 17. The Lockheed Fourteen carried some 390 lb. of parcels in charge of Canadian National Express, and the Mayor of Montreal, Mr. Raynault, was present at St. Hubert Airport to see the machine off.

The various packages were addressed to all the seven cities on the service route—Ottawa, Toronto, Winnipeg, Regina, Lethbridge, Edmonton and Vancouver—and the machines are scheduled to cover the 2,700 miles between the terminals in 20 hours.

Passengers are not yet carried on the service, but on this initial trip various officials, including Mr. Bellerose, the General Manager of Canadian National Express, and Mr. W. S. Thompson, Director of Publicity, Canadian National Railways, were on board.

According to the tariff rates which have previously been issued by T.C.A.L., packages to be sent on the service may at present weigh up to 200 lb. apiece.



NEW YORK CENTRAL : A plan of the new land-sea air-port for New York, which is expected to be completed towards the middle of next year. The North Beach air terminal, as it is called, is not more than twenty-five minutes by bus from the centre of the city and the whole project is of somewhat staggering immensity. Two-thirds of the area concerned is "made land," since it was previously a vast swamp. Work has apparently been going on night and day, and the total cost is estimated at about twenty-eight million dollars.

ATLANTIC A

The Shannon Air Base and Dublin's New Terminal Described : Mile-long Runways at Each : Comprehensive Radio Equipment

By H. A. TAYLOR

IT is almost ironical that, in the one country where distances and conditions have not so far necessitated the development of civil aviation on a large scale, work should now be going ahead rapidly with the construction of two of the largest aerodromes in Europe. Eire has had little need for airlines of its own and only comparatively recently has an Irish company been operating services between Dublin and Great Britain. These services, run in pool with a British concern, started in May, 1936, and they are (partly because they pass over comparatively long stretches of sea) very reasonably well patronised. It is likely that the Dublin-London run, at least, will eventually prove to be more important than any of our own internal services.

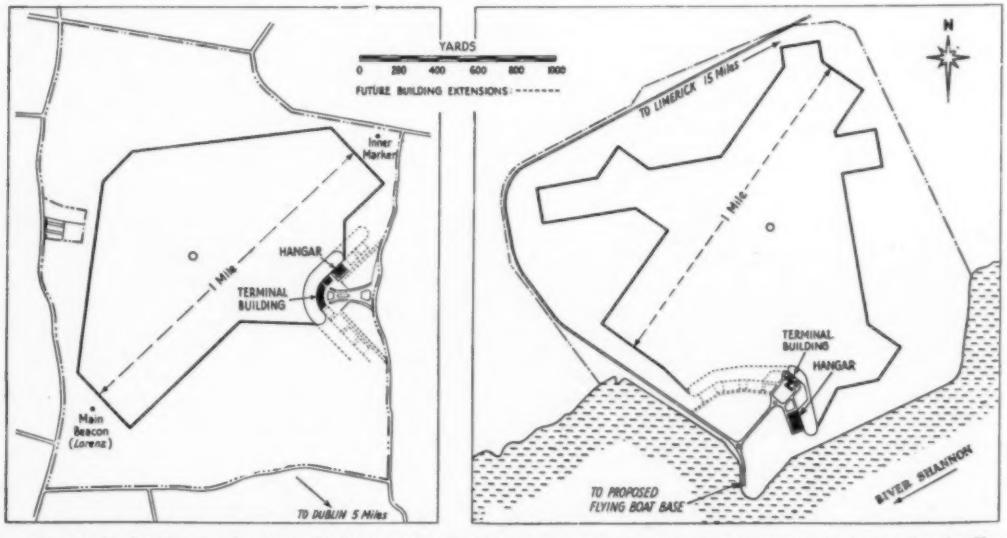
The Government of Eire is, however, taking a specially full and practical interest in Atlantic air services. Obviously, until machines are produced which will carry something resembling a useful payload across the Atlantic between capital and capital, it will be necessary to use the two nearest points for the development of ground organisation. These points are Eire and Newfoundland. Even when technical improvements permit capital-to-capital transport, there will still be considerable advantages in using the Shannon, and Irish hopes are that its position will help to make the airport the international junction for the transatlantic and the attendant feeder services. Passengers (or mail) will then have the option of leaving or joining the machine at the Shannon.

Two years ago the selected flying-boat base at Foynes, on the south side of the Shannon estuary, was equipped with the necessary meteorological and operational facilities, and these were used for the experimental services across the Atlantic last year and for *Mercury's* one flight this year. At the same time, a long-range, short and medium-wave wireless direction-finding station was laid out on the north side of the Shannon at Ballygirreen, Co. Clare, and this station will remain the centre for all Atlantic communication work.

Now, in addition, a new landplane base at the variously spelt Rineanna, Co. Clare, is well on the way towards completion, and it remains to be seen whether Foynes, which is some twelve miles away and on the other side of the water, will continue to be the flying-boat centre. Probably it will, at least for a year or two; the work involved in building a roadway over the mud between the new airport and the suggested flying-boat base on Dernish Island (with the arrangement of the necessary slipway facilities and the dredging of the estuary) is likely to be considerable.

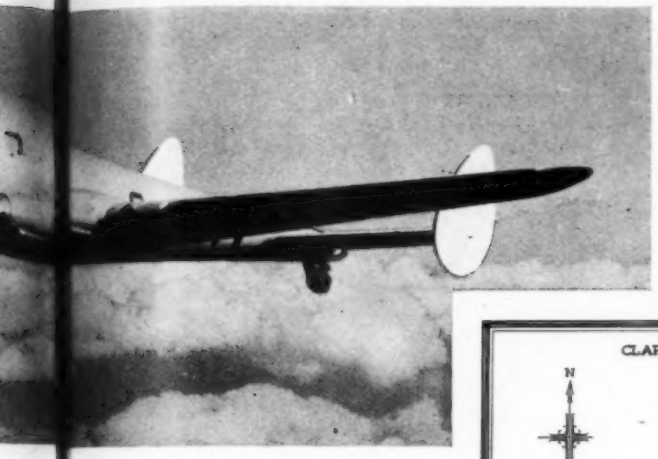
Incidentally, the local population at Foynes has always been very keen on the idea of having the land airport there, and it was even suggested that the way out of the difficulty would have been to cut the top off of Foynes Island itself! The latter provides the shelter which helps to make the base there so very suitable, and anybody who has seen the island will agree that this idea, to say the least of it, is impracticable. The district appears to have no possibilities for airport construction at reasonable cost.

Curiously enough, the internationally less important new airport for Dublin, at Collinstown, was the first of the two to be ready for use. The policy of aviation development led to the decision by the State to provide a first-class

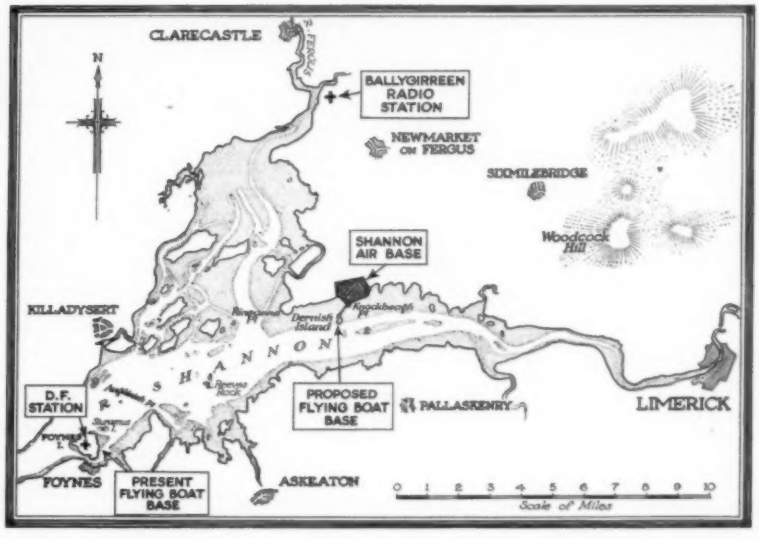


The two airports in detail. On the left is Dublin's new terminal at Collinstown, while on the right is the layout for the Shannon Air Base. At the moment the main runway strip at Collinstown is ready for use and work is going ahead on the marked area towards the north-west. All the runs at Rineanna will be a mile long.

C AIRPORTS



A map of the Shannon area (right) showing the position of the new airport and future flying-boat base in relation to the present centre at Foynes. The operational advantages of Foynes are obvious, but eventually the still greater advantages of centralisation will probably mean that Dernish Island will become the flying-boat base. Above is the long-range D.H. Albatross, which will probably be the first machine to make serious use of both the Shannon Air Base and Collinstown, Dublin.



airport for Dublin. No doubt the municipal authority will contribute towards the cost of what in these days is regarded almost as an essential provision in any urban area of importance. The programme for transatlantic experimental work demanded a landplane base for this year, and as the Shannon was the longer job, work was concentrated on Collinstown. As it happens, no Atlantic landplanes have yet made use of it. Later this year, or perhaps in the early spring, the first D.H. Albatross should be leaving Collinstown for the equally new airport at Hattie's Camp, Newfoundland. Provided that the wind is not blowing too strongly from an unusual direction, the completed area at the airport should already be ample for any possible purposes—even with an overloaded aeroplane. The length of the completed strip is a little over a mile, and in each direction the approaches are well-nigh perfect. The "strip," if so it can be called, is 400 yards wide and the finished landing area may now be used at any time by any transport aeroplane, provided that the pilot is ready to land and take off, if necessary, slightly out of wind.

About 260 acres, which had been used by the Royal Flying Corps as an aerodrome prior to 1921, were already State property and about 450 additional acres were purchased for expansion and in order that trees, with farms and other buildings which might form possible obstructions, could, where necessary, be removed. The whole area is bounded by four roads. The flying field which is actually being prepared covers 300 acres. The completed 1,800 yard strip lies in a S.W.-N.E. direction, which is that of the prevailing wind, but work on the rest of the area, extending to the north-west, is going ahead rapidly and before next summer there will be runs of 1,000 to 1,400 yards in this direction. One of the illusions resulting from an examination of this exceptionally long stretch of already prepared ground is that the extent of the new 1,000 yard run to the N.W. seems to be inadequate by comparison. Such is the effect of sheer size.

Because the time factor was of considerable importance, the original turf at Collinstown was actually removed in small sections and replaced after the area had been drained and levelled. This method of grassing is obviously much more expensive than that of seeding, and was only resorted

The Foynes base, which is the present centre for transatlantic experiments. The meteorological and general centre is on the extreme right, while there is a D/F and short-range transmitting station on Foynes Island—which is out of the picture on the left.

to because the main runway was urgently required. The levelling operations, involving the removal of what amounted to a hill in the centre of the main runway, were of no mean order, and the gradient of the hill, by levelling and filling, was duly reduced to a maximum of 1 in 100.

The radio equipment at present installed at Collinstown includes Standard-Lorenz blind-approach beacons, a medium-wave D/F receiver and four special receivers for meteorological interception. The main approach beacon (working on a wavelength of 9 m.) is laid out near the S.W. boundary, at the end of the long run, while the inner marker lies beside the N.E. boundary and the outer marker a matter of 3,630 yards from this boundary and on the N.E.-S.W. approach line. Both the marker beacons transmit in the usual way on a wavelength of 7.9 metres. At present this approach equipment is remotely controlled from a temporary station, but the repeater panel will eventually be installed in the control room of the terminal building which is now in course of construction.

The Marconi medium-wave D/F receiver is designed for use either with an Adcock aerial system situated about 400 yards from the aerodrome boundary, or with Bellini-Tosi loops mounted on the roof of the control station. The wave-range used is 800 to 2,000 metres.

Two of the four meteorological receivers, which will be used by the appropriate staff for the interception of the regular bulletins, work on a wave-range of 14 to 200 metres, while the two others work on 15 to 20,000 metres.

All the initial work on the site of Collinstown, which is only about five miles in an approximately northerly direction from the centre of the city, was done by the Government as a direct labour scheme. Now, however, that the time has come to lay out the terminal building, this work has been taken over by a contractor and the preparation of the foundations has already been started.

Modern Layout

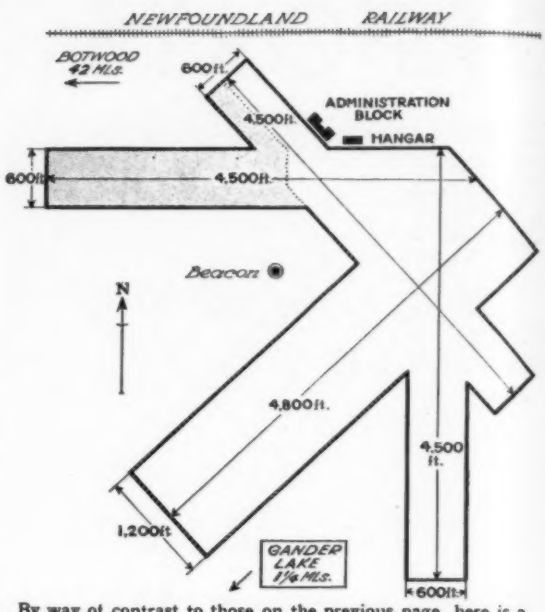
This terminal building will be sufficiently large and up to date for Collinstown to be capable of dealing with any possible increases of traffic during the next two or more decades. There are four main floors, but the length of the building is such that the proportions remain well balanced. With its apron, the terminal building is placed on the eastern side and such a relation to the north-west-south-east runway that it does not form an obstruction. In plan form the main building is curved, with the outer radius facing the landing area. By way of a start, one large hangar will be constructed as a separate extension, so to speak, of the north-easterly wing, but the ultimate plans include the laying out of several other hangars on either side of the building and forming the customary wedge of buildings. When the buildings at Collinstown can be occupied, the intention is to transfer there all civil flying activities from Baldonnel.

As will be seen from the accompanying plans, further areas are available for development at Collinstown, and these, when brought in, will provide mile-long runways in every direction.

It is probable that very few lay people realise the magnitude of the engineering work involved in laying out a really large airport. When present-day sizes in landing areas are being considered it is by no means enough to level the area, to remove hedges and to fill and re-drain ditches. The entire surface must be virtually lifted and drains laid before the real work can be started. The new Shannon Air Base at Rineanna carried what must amount to nearly a hundred miles of drainage.

The chosen area on the Shannon was already free from serious obstructions and was, in fact, a salt marsh until a hundred years ago. At that time it was drained and protected with a mole from the inroads of the tides. This mole has now been greatly strengthened, new outfall sluices, fed from the main drains, have been constructed to cope with surface water, which is to be continuously removed with the help of three electric pumps.

When completed the airport area will be approximately diamond shaped. This shape is made up of four runways intersecting one another at 45 degrees, and each a matter of 1,800 yards long. The main one, again lying N.E.-S.W.,



By way of contrast to those on the previous page, here is a plan of the Newfoundland airport at Hattie's Camp. The part of the runway system which had been completed last January is shaded. Before next spring the whole area should be in use. The administration building and hangar are ready now.

will be 400 yards wide, while the others will be 200 yards wide, and the centre area will, of course, be completely turf-covered. One long section of the main runway now has its grass, but it is not yet fit for use. The entire area should be in working order before next summer.

As in the case of Collinstown, a blind-approach beacon will probably be installed at the south-west end of the main runway, and the provisional terminal buildings on the south side (beside the Shannon) is likely to carry short-range D/F equipment. The aforementioned main station at Ballygirreen lies some six miles north-west of the site.

The equipment at this main station is, rather naturally, considering the work that has to be done, very complete indeed. It consists of two short-wave transmitters, two medium-wave transmitters, a short-wave direction-finder and the usual medium-wave direction-finders.

Transatlantic Communications

One of the two short-wave transmitters works on any frequency between 21,420 and 3,000 Kcs. (14 and 100 m.) and is used for point-to-point communication with Botwood, Newfoundland. Five different frequencies are normally used, these being 17,000, 11,470, 8,240, 5,375 and 3,437.5 Kcs. The other short-wave transmitter is crystal-controlled on five frequencies of 12,320, 8,240, 5,672.5 and 3,082.5 Kcs. and is used for calling up machines. The normal frequencies of the first of the medium-wave transmitters are 333 Kcs. (900 m.) and 500 Kcs. (600 m.). The second medium-wave transmitter can also be used for short-wave work and has two tuning ranges, one from 40 to 80 m. and the other from 500 to 1,000 m. Each of these transmitters can, of course, be worked on telegraphy or telephony.

The short-wave D/F installation (14 to 200 m.) is housed in a separate building about 400 yards from the nearest aerials, and the operator there can remotely control the second of the two short-wave transmitters when working bearings with a machine. The medium-wave D/F receiver uses a wave-range of 375 to 150 Kcs. (800 to 2,000 m.), and this is arranged in the centre building.

Additionally, there are three short-wave receivers (14 to 200 m.) in the main station, which also accommodates a medium-wave D/F receiver. All transmitters (one of the short-wave transmitters is actually three miles away

COMMERCIAL AVIATION : ATLANTIC AIRPORTS (CONTINUED)

from the main station) can be controlled at this point.

When the Shannon Air Base buildings are completed all general reception and point-to-point telephone services will have their centre in the control room, where also there will be remotely operating equipment for the transmitters at Ballygirreen. At the same time the meteorological activities which are at present centred at Foynes (where there are three medium-long-wave receivers and two short-wave receivers for this work) will also be transferred.

On Foynes Island itself there is at present medium-wave D/F equipment for short-range approach work, and with this, in the same building, there is a small transmitter used for last-minute communication with the flying-boats. Needless to say, this station is in telephonic communication with the control centre at Foynes and with the main station at Ballygirreen.

One of the first things to be done at the Rineanna site was to lay down a concrete road replacing the narrow country track which originally connected the village to the main road between Limerick and Ennis. This new road is more than three miles long and was itself an engineering feat of no mean magnitude.

With the facilities available at Foynes for flying-boats, only preliminary survey work has so far been carried out on the flying-boat base project alongside the land aerodrome at Rineanna. It is no easy matter to foresee the requirements of operating companies and their decisions concerning the relative advantages of landplanes and flying-boats on the Atlantic services, and the Irish Government are, no doubt, giving full consideration to these factors before coming to a decision. The Dernish Island site is on the north channel of the Shannon which is not at present used by shipping to and from Limerick.

The entire cost of the Shannon Air Base, including all the work on the land and the erection of the terminal building with the necessary equipment, will be close on half a million pounds, and is being carried by the Government of Eire. The cost of the project at Collinstown, again including all the work and equipment, is rather less, and is estimated to be about £360,000.

K.N.I.L.M. to Manila

APPARENTLY the obstacles which have appeared in the way of K N I L.M.'s proposed Manila service have now been cleared up and a representative of the company will shortly visit Washington to negotiate the details of the agreement. The American Government had previously feared that the Japanese would, in turn, demand permission to extend one of their own services to Manila, but it is now agreed that this service will terminate on an island of the Batan group, north of Luzon.

The Coming Show

THE largest machine on view at the Paris Aero Show, which opens on November 22, will probably be the Farman 2234. After counting the prototype—the *Laurent Guerrero*, named after the Air France transatlantic pilot of that name—the machine on view will actually be No. 2 of the series of three of these four-engined landplanes. These will be fitted with pressure cabins for Air France's transatlantic experimental flights over the Northern Ocean at sub-stratopheric altitudes under the command of Paul Codos.

The first of the series is out of action for the moment, having had the 690 h.p. 12X Hispano engines taken from their mountings with a view to replacing them with 12Y's of 860 h.p., and the third will not be ready to fly till March of next year. After removal from the Salon D'Aviation the second of the trio is scheduled to make its first flight during January.

At the last Salon, in 1936, a close relation of the *Laurent Guerrero* was on view and dominated the Show. It was the Farman 40-seater built for Air France. But the whole series of these was surrendered to the Government for military use.

K.N.I.L.M. Anniversary

ON November 1, K.N.I.L.M. (Royal Netherlands Indies Airways) commemorated their tenth anniversary. The company started operations in 1928 with two daily services between Batavia and Bandoeng. To-day, in addition to these services, which are operated twice or three times daily, they run between Batavia and Sourabaya; between Batavia, Palembang and Singapore and Saigon; between Batavia, Palembang and Pakanbaroe; between Sourabaya, Bandjermasin, Balikpapan and Tarakan; between Batavia and Bali; between Batavia and Macassar; and, finally, between Batavia, Koepang, Darwin, Cloncurry, Longreach, Brisbane and Sydney. This last, of course, forms the Intercontinental Airline connection between Amsterdam and Sydney, the western section of which is operated by K.L.M.

More services are at present under consideration, These are an extension of the Tarakan service to Manila, *via* the Philippine Islands; an extension of the Manila service to New Guinea *via* Ambon; a service from Batavia *via* Benkoelen to Padang Medan and Sabang; and a new route *via* Billiton and Pontianak to Singapore.

The present K.N.I.L.M. fleet consists of the old three-engined Fokkers with three Douglas D.C.2s and five Lockheed 14s. The latter are used on the Sydney service. Additionally, the company uses D.H. Rapides for survey work.

In South America

IN the near future K.L.M. will be starting a fast service on their West Indian lines between Curaçao, Aruba, Maracaibo, and Barranquilla, using Lockheed Fourteens. The run will be made twice weekly, and the whole distance, including the time of the intermediate landings, will be covered in 2½ hours.

After a preliminary run on October 19 between Barbados, Trinidad and Curaçao, K.L.M. will start a regular service on this route on January 1. The service will be operated three times weekly and will connect with P.A.A. at Trinidad.

Farther south, in Brazil, the Panair Company have discontinued their service between Manãos and Porto Velho. Some time ago their service between the latter point and Rio Branco was also given up. The reason for these stoppages is that the hoped-for subsidy from the Brazilian Government has not been forthcoming.

Rationalisation

IN *Flight* of October 6 it was explained that American Export Lines, the shipping concern, had ordered, through its subsidiary, American Export Airlines, a special long-range Consolidated flying-boat and provisional details were given of this machine.

It is now learnt that the company has signed a fifteen-year agreement with Pan American Airways, pledging co-operation and assigning the geographical areas which each will serve. Both will operate from the United States to France and Germany and both will seek to operate an equal number of transatlantic schedules every week. Ground facilities in general, with wireless and meteorological services, will be shared in certain cases.

Remembering Pan American Airways' agreement with Imperial Airways, this "pledge" is interesting and the agreement includes details of some international importance. Pan American Airways, for instance, will be permitted to establish a round-the-world service stopping at Export ports, but only under certain conditions. Such trips must not be made more than once a month in each direction and P.A.A. will pay Export 40 per cent. of the traffic revenue taken on certain sections.

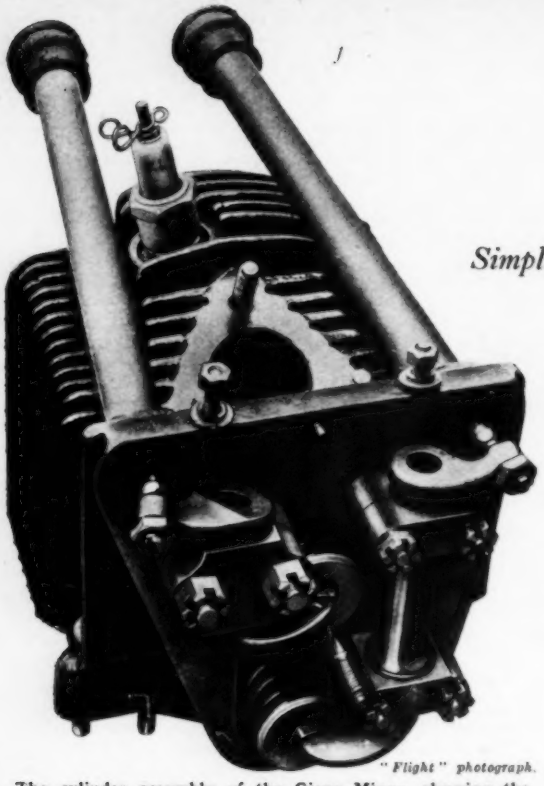
The P.A.A.-I.A L. agreement is covered by the fact that American Export has promised not to operate services to Great Britain, Eire, Finland, Estonia, Bermuda, Latvia, Holland, Lithuania, Denmark, Iceland, Czechoslovakia, Norway and Sweden. At the same time P.A.A. will not offer commercial services in or to Italy, Greece, Yugoslavia, the Mediterranean Islands, Roumania, Western Asia (as far as the Persian Gulf), Albania, Bulgaria, North Africa and Turkey.

Each will seek from France, Germany and the United States permission to operate an equal number of round trips every week with not less than one round trip to or through France. If Export Airlines run a transatlantic service to Russia this will be by a route south of Poland, while Pan American Airways will fly over a route north of Poland. At the same time Export agrees to restrict all transatlantic activities via Canada or Newfoundland to those of an experimental nature.

These facts are the more important in an agreement which covers, it appears, practically all eventualities.

THE D.H. G

Simplicity of New 80/90 h.p. Four-in-line : Power Un Mo



"Flight" photograph.

The cylinder assembly of the Gipsy Minor, showing the inclined push-rods and the disposition of the valves.

IN the words of its manufacturers, the new De Havilland Gipsy Minor engine is intended specifically to meet a new demand for light aircraft of essentially simple type, where robustness, economy, and ease of maintenance are paramount requirements. The first installation has been made in the De Havilland Moth Minor low-wing light monoplane.

The new engine has a comparatively low compression ratio, and consequently is not restricted to the use of fuels of high octane rating.

Magnesium-alloy castings are used for the crankcase and top cover. The main bearing studs extend through the top cover on each side of the crankshaft centre line; an oil joint is maintained by close-pitched bolts round the joint faces. The main bearing housings are formed half in the top cover and half in the crankcase, ensuring, it is claimed, extreme rigidity of the bearing housing.

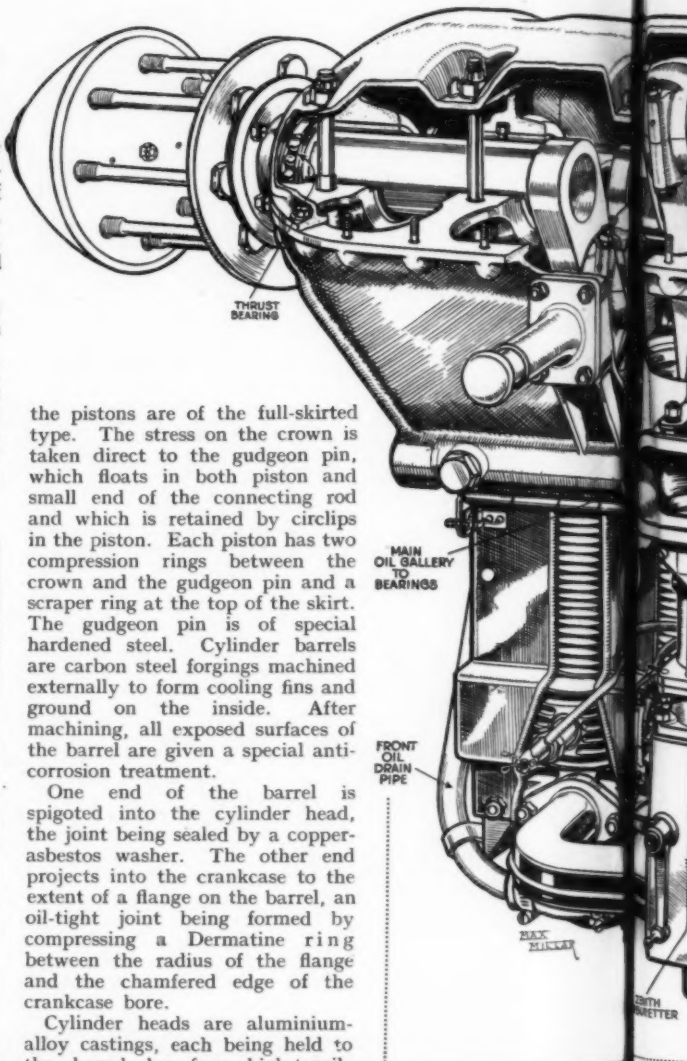
DE HAVILLAND GIPSY MINOR

TYPE	Inverted four-cylinder-in-line.
ROTATION	left-hand tractor.
FIRING ORDER	1, 3, 4, 2.
BORE	4.016in. (102 mm.).
STROKE	4.528in. (115 mm.).
CAPACITY	229.29 cu. in. (3.759 litres).
COMPRESSION RATIO	6: 1.
WEIGHT (complete airscrew boss)	210 lb. (±5 lb.).
FUEL CONSUMPTION (climbing at 2,250 r.p.m. and full throttle near sea level with mixture control in fully rich position)	5¾-6 gal./hr.
FUEL CONSUMPTION (cruising at 2,250 r.p.m. near sea level with mixture control adjusted to give weakest mixture for maximum power)	4/4¼ gal./hr.
FUEL CONSUMPTION (all-out level flight at 2,600 r.p.m. and full throttle near sea level with mixture control in fully rich position)	6¼/6¾ gal./hr.
MAXIMUM CRUISING r.p.m.	2,250.
OIL CONSUMPTION (cruising)	0.5/1.5 pt./hr.
MAXIMUM POWER FOR CLIMB	80 h.p. at 2,250 r.p.m.
MAXIMUM LEVEL POWER	90 h.p. at 2,600 r.p.m.
NORMAL CRUISING POWER	60 h.p. (66.6 per cent.) at 2,250 r.p.m.

Main bearing bores are of uniform diameter and can be machined in line. Appropriate facings are provided on the crankcase for bearer feet, and provision is made for lifting eyes. The crankshaft is a nickel-chrome-alloy steel forging machined all over and balanced statically and dynamically. It rotates in six white-metalled, steel-backed main bearings. The journals and pins are drilled not only for lightness, but to allow for pressure lubrication to the main and big-end bearings. To locate the shaft and transmit fore and aft loads from the airscrew, a ball thrust bearing is provided at the front end.

Connecting rods are of "H" section, machined from heat-treated aluminium-alloy forgings. Big ends are fitted with steel-backed white-metalled bearings and are clamped together by two bolts of high-tensile steel. Drillings in the big ends allow oil to lubricate the cylinder wall and small-end bearings by splash.

Machined from cast and heat-treated aluminium alloy, the pistons are of the full-skirted type. The stress on the crown is taken direct to the gudgeon pin, which floats in both piston and small end of the connecting rod and which is retained by circlips in the piston. Each piston has two compression rings between the crown and the gudgeon pin and a scraper ring at the top of the skirt. The gudgeon pin is of special hardened steel. Cylinder barrels are carbon steel forgings machined externally to form cooling fins and ground on the inside. After machining, all exposed surfaces of the barrel are given a special anti-corrosion treatment.



One end of the barrel is spigoted into the cylinder head, the joint being sealed by a copper-asbestos washer. The other end projects into the crankcase to the extent of a flange on the barrel, an oil-tight joint being formed by compressing a Dermatine ring between the radius of the flange and the chamfered edge of the crankcase bore.

Cylinder heads are aluminium-alloy castings, each being held to the barrel by four high-tensile

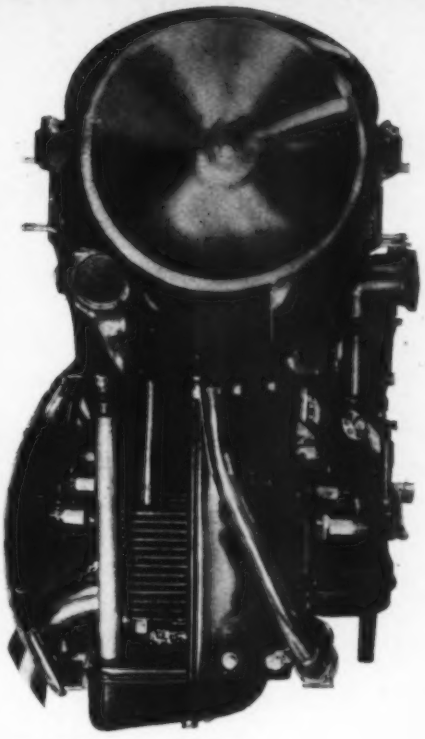
H. GIPSY MINOR

Moth Minor Available for Light Aircraft Installation

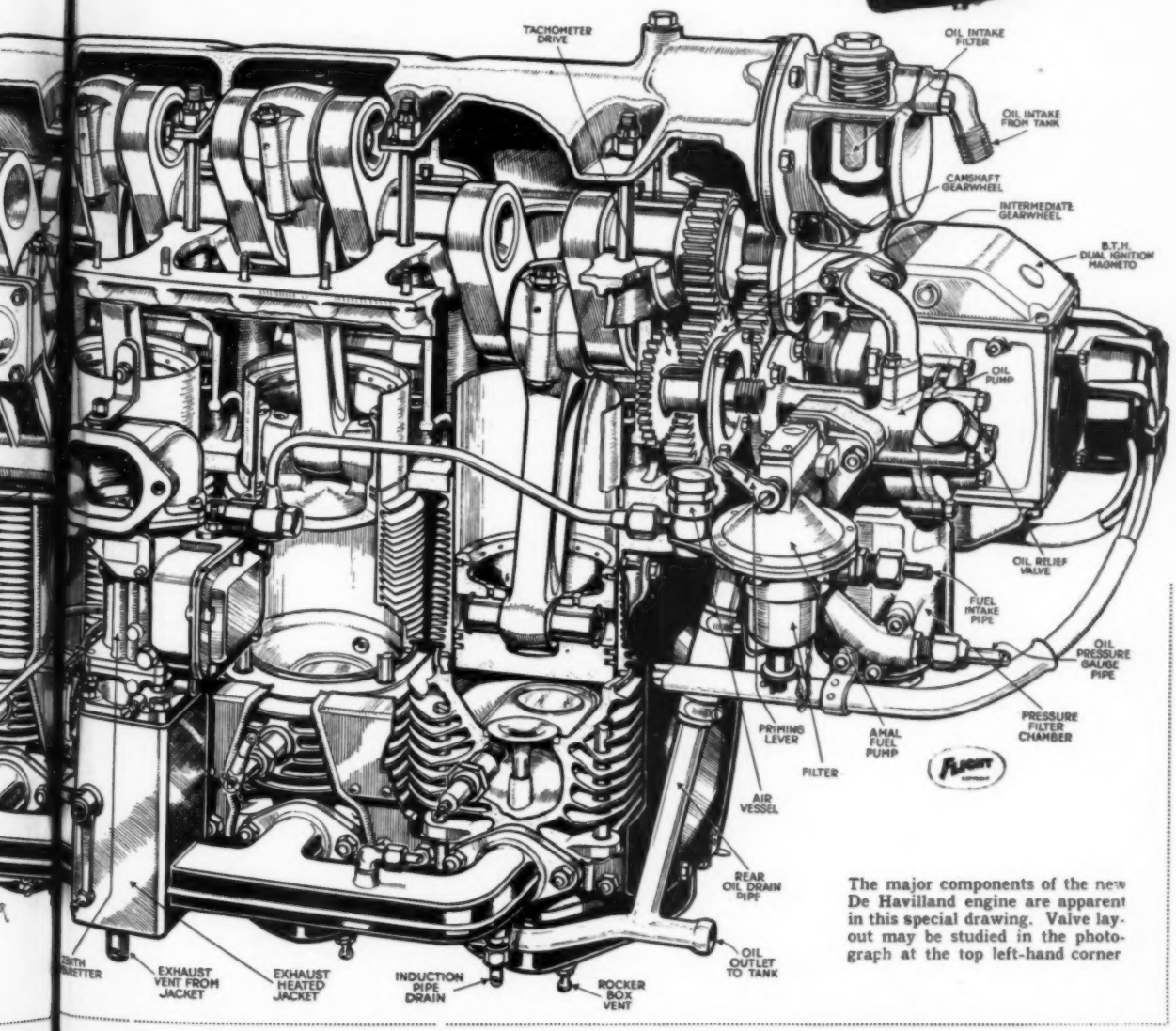
steel studs screwed at their upper ends to the crankcase. A gas-tight joint is maintained between the head and the barrel by a copper-asbestos washer located in a recess in the cylinder head. Flanged bronze guides are fitted for one inlet and one exhaust valve; both are arranged vertically. The high-expansion steel seatings are shrunk and peened into position in the head.

Dual ignition is provided for each cylinder by two 14 mm. sparking plugs fitted one on each side of the compact combustion chamber.

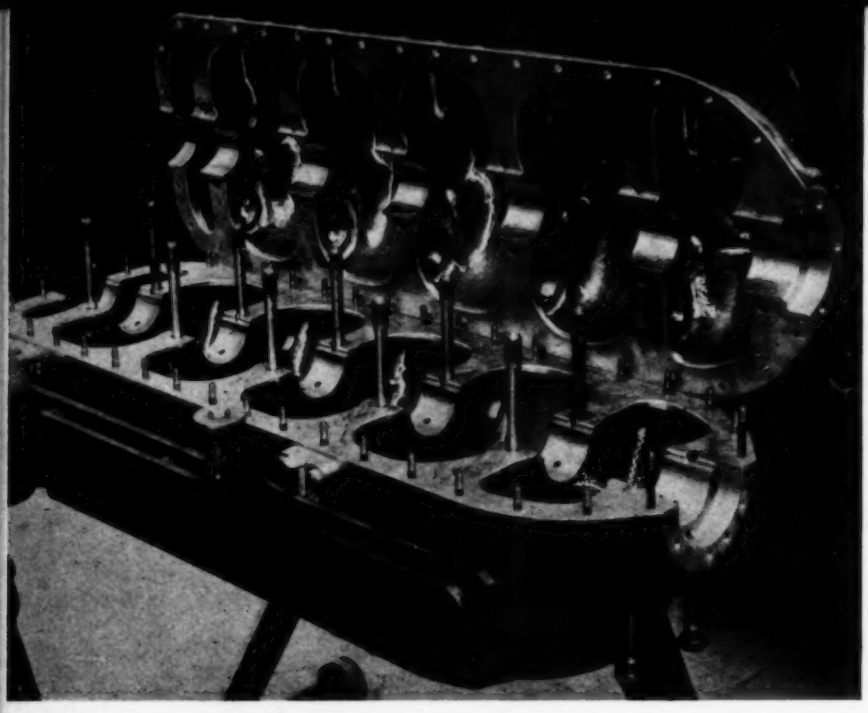
The camshaft is on the starboard (exhaust) side of the engine and runs in five bearings in the crankcase. It is driven from the rear end of the crankshaft by spur gears, and operates the valves through hardened-steel tappets, tubular steel push-rods (ball and cup-ended), and rockers. The rockers are manufactured integral with their spindle and lie in bearings of light alloy with split housings attached to the cylinder heads.



That the Gipsy Minor lends itself to an efficient cowling will be inferred from this frontal view of the compact new unit.



The major components of the new De Havilland engine are apparent in this special drawing. Valve lay-out may be studied in the photograph at the top left-hand corner



"Flight" photograph.
A general view of the Gipsy Minor engine showing that, despite the novel appearance of the top cover, it is typically De Havilland.

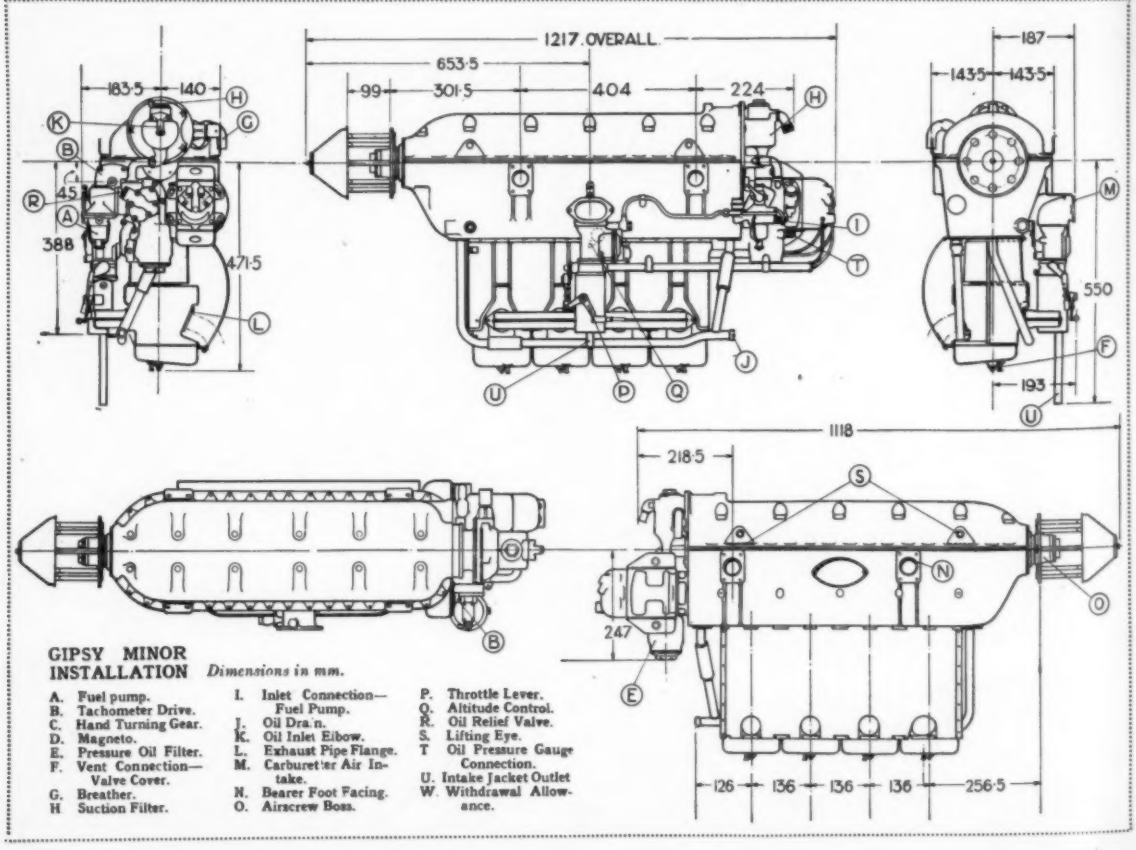
The B.T.H. C.S.E.4—4U duplex magneto has been designed specially for the engine, and embodies a complete dual electrical ignition system in one unit, effecting a considerable saving in weight. Also incorporated in the magneto drive are an impulse starter and an automatic timing device which obviates external ignition controls to the cockpit. The tachometer drive operates at engine speed. The carburetter is a Zenith 40FAIH downdraught type and is placed on the port side of the engine. The induction pipe riser is jacketed and connected to the exhaust manifold to provide warm mixture and to improve mixture distribution.

Fuel is fed from an Amal 120 AB/2 fuel pump insulated against heat by a micarta block. There is a mixture control on the carburetter in the form of an air-bleed valve operated by hand from the cockpit.

A gear-type pump situated on the rear of the engine draws oil from a separate tank. Pressure is regulated to 40-45 lb./sq. in. by an adjustable relief valve in the cover of the pump casing. From the pump the oil under pressure flows through a gauze filter which is removable for cleaning. From the filter the main supply is taken to a gallery cast in the side of the crankcase and connecting through drillings to the main bearings. Thence the oil passes into the crankshaft and so through the hollow journals and crankpins to the big ends. Holes are drilled in the big-end bearings and connecting-rod caps, from which oil is

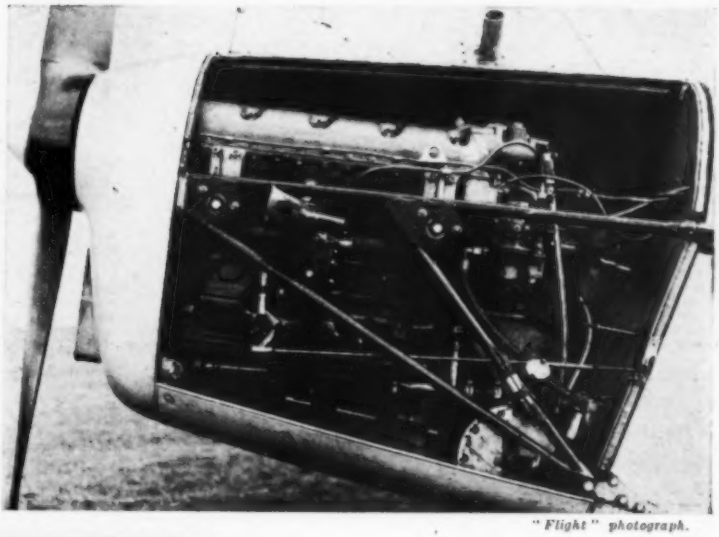
Adjustment of valve clearance is effected by a movable screw and lock-nut assembled in the push-rod end of the valve rockers. The whole of the valve gear is totally enclosed and is lubricated by splash from the rockers dipping into an oil reservoir formed in the valve rocker casing covers.

Housed in an extension of the crankcase is the train of timing gears. From this train are operated the oil pump, duplex magneto, Amal fuel pump, and single tachometer drive. The drive to the magneto is taken through a special spring-pack coupling to absorb vibration. In this coupling is a vernier device for adjusting the timing of the ignition system.



GIPSY MINOR INSTALLATION *Dimensions in mm.*

A. Fuel pump.
B. Tachometer Drive.
C. Hand Turning Gear.
D. Magneto.
E. Pressure Oil Filter.
F. Vent Connection—Valve Cover.
G. Breather.
H Suction Filter.
I. Inlet Connection—Fuel Pump.
J. Oil Drain.
K. Oil Inlet Elbow.
L. Exhaust Pipe Flange.
M. Carburetter Air Intake.
N. Bearer Foot Facing.
O. Airscrew Boss.
P. Throttle Lever.
Q. Altitude Control.
R. Oil Relief Valve.
S. Lifting Eye.
T Oil Pressure Gauge Connection.
U. Intake Jacket Outlet
W. Withdrawal Allowance.



The Gipsy Minor as installed in one of the D.H. Moth Minors now flying at Hatfield. This view shows the formation of the front of the air-scoop.

"Flight" photograph.

thrown on to the cylinder walls and pistons. Proper lubrication of the pistons is thus established immediately the engine is started. Another point is that the supply of lubricant to the cylinder walls is maintained irrespective of wear and clearance in the main bearings. The spray created inside the crankcase serves to lubricate the camshaft bearings, cams, and tappets, and as a good deal of it ultimately comes into contact with the walls of the top cover a useful cooling effect is obtained. After passing through the engine the oil collects in the space formed by the extension of the cylinders into the crankcase, whence it drains through external pipes to the tank.

Fuel not inferior to 70 octane number is necessary. This specification embraces almost any high grade of car fuel, while the special high expansion steel valve seatings and stellited exhaust valves permit the use of leaded fuels.

"Flight" photograph.

The full-skirted piston, with its compression and scraper rings, and the connecting rod and the valves, with their springs, as fitted to the Gipsy Minor. The valves are disposed transversely in the cylinder head.

The airscrew boss weighs 6 lb.; it is fitted on a tapered extension of the crankshaft and driven by a key. The airscrew itself is attached by eight through-bolts passing between the front and rear airscrew boss flanges. Positive means of locking the airscrew nuts are provided, with a quickly detachable spinner on the front plate. Provision is made only for a fixed-pitch wooden airscrew.

At Stag Lane last week we were able to inspect the "type test strip" of a Gipsy Minor, many major parts of which had done 130 hours' running beforehand. To use the words of Mr. Brodie, of Major Halford's office, it was "a beauty."

And so, in its way, was the specially finished Paris Show engine, looking very smart in its black and red finish with transparent air scoop and taking its place alongside the Gipsy Major, Six and Gipsy Twelve.

SOME CONTRIBUTORS TO THE GIPSY MINOR

Carburetter, Zenith Carburetter Co.; magneto, British Thomson-Houston Co., Ltd.; petrol pump, Amal, Ltd.; non-ferrous castings, Anti-Attrition Metal Co.; bolts, nuts and washers, Alfred Beebee, Ltd., and M.C.L. and Repetition, Ltd.; gear machined to drawing, C. J. Fitzpatrick and Co., Ltd.; con-rod bearings, Glacier Metal Co.; con-rod stampings, High Duty Alloys, Ltd.; joints, Hall and Hall, Ltd.; cylinder-crankcase sealing rings, the Dermatine Co., Ltd.; valve springs, Lion Spring Co.; cylinder head and other castings, Wm. Mills, Ltd.; valves, Metal Components, Ltd.; crankshaft machined to drawing by Ambrose Shardlow, Ltd.; crankcase, top cover, castings, etc., Sterling Metals, Ltd.; piston machined and assembled with rings and circlips by Specialloid, Ltd.; camshaft, prop, boss and tappets, Weyburn Engineering Co.

DEPOSITION ON THE GRAND SCALE

DURING the course of a recent visit of inspection to the new works of Fescol, Limited, a representative of *Flight* was able to see the many applications of the Fescol electro-chemical deposition process as applied to the aircraft industry. By this process it is possible to apply comparatively heavy deposits of metal to an extent hitherto regarded as impossible. It can be used for the reconditioning of parts which have become worn in use, for the rectification of machine-shop errors, for protection against corrosion, and for improving the quality of wearing surfaces.

Fescol, Ltd., once occupied a small factory in South-East London. In 1926 they moved into larger premises in Grosvenor Road, where they occupied over 24,000 square feet of floor area. By 1937 even this factory proved inadequate to deal with the volume of business, and it was eventually decided to move into the present premises at North Road, London, N.7, where the company occupies over 40,000 square feet of floor space.

Here is installed some of the most up-to-date and the largest plant devoted to electro-chemical deposition in this country, if not in the world. The equipment includes several unusual features. The electrical power is supplied in single-phase form. By means of B.T.H. capacitor pilot motor single three-phase converters, the power is transformed into three-phase form. Next it is converted into low-voltage D.C. by means of motor generators and Westinghouse rectifiers. A total of 15 sets is in use, giving a maximum output of 16,500 amperes, while nine equipments, each having an output of 1,500 amperes at 12 volts, are housed in a special sub-station.

There are two main depositing shops, one for nickel, copper, cadmium and lead, the other for chromium deposition. The former is the largest shop, capable of dealing with work up to six tons in weight and shafts up to 20ft. in length—the vats are 15ft. deep by 12ft. by 8ft. The chromium vats, which are suspended in a false floor to provide a convenient working level, are capable of treating shafts up to 10ft. 6in. in length. Three-ton cranes serve the heavy side of this department. Here a number of vats were devoted to chromium deposition on oleo legs, retractor mechanism, valve blocks, works plugs, etc.

Adjacent to this shop is an efficient machine shop equipped with many types of grinding, turning and screw-cutting machinery, including a Naxos-Union lathe and grinder capable of dealing with shafts up to 26ft. long and 2ft. 6in. in diameter—not that one habitually finds such shafts in aeroplanes, but if our commercial aircraft get much larger. . . .

A side view of one of the long-range Wellesleys showing that the fuselage is comparatively short in relation to the wing span. The special cowling and fairing arrangements may be noted.

TRIPLE TRIUMPH

The Long Range Development Unit Breaks World's Distance Record

R.A.F. official photographs, Crown copyright

TWO Vickers Wellesley monoplanes slipped out of the overcast at Darwin, Northern Australia, just after 4 p.m. (G.M.T.) on Monday, having flown 7,162 miles non-stop from Ismailia, Egypt, in about 48 hours, beating by 856 miles the world's long-distance record set up by the Russians Gromov, Yumashev and Danilin, who flew from Moscow to California in July last year.

A third machine (which easily broke the record) was forced to land at Koepang, in the Island of Timor—400 miles from Darwin—owing to shortage of fuel. It left at 4 a.m. for Darwin and landed at 7.36.

The record was actually beaten when the Wellesleys passed the southern end of the Island of Celebes, in the Dutch East Indies.

The machines which completed the journey non-stop were manned by the following crews: (No. 1 — L.2638) Sqn. Ldr. R. Kellett (1st pilot), Flt. Lt. R. T. Gething (2nd pilot and navigator), and Pilot Officer M. L. Gaine (Signals Officer of the Unit); (No. 2 — L.2639) Flt. Lt. H. A. V. Hogan (1st pilot), Flt. Lt. R. G. Musson (2nd pilot and navigator), and Sgt. T. D. Dixon (wireless operator-mechanic). The third machine (L.2680) was manned by Flt. Lt. A. N. Combe (1st pilot), Flt. Lt. B. K. Burnett (2nd pilot and navigator), and Sgt. H. B. Gray (wireless operator-mechanic). The Signals Officer and the wireless operator-mechanics were qualified pilots.

The average speed of the Wellesleys works out at just under 150 m.p.h., compared with the 102 m.p.h. of the Russians.

Sqn. Ldr. Kellett, who is Flight Leader of the Long Range Development Unit, said on landing that he had never felt better. The flight had been excellent.

In Wellesley L.2680: Sgt. H. B. Gray, who kept wireless contact for weather warnings and sent progress reports.

R.A.F. official photograph, Crown copyright

The personnel of the Long-Range Development Unit: (Standing, left to right), Sgt. J. H. Houghton, Flt. Lt. G. T. Gething,* Pilot Officer M. L. Gaine,* Sgt. H. B. Gray,* Sgt. T. D. Dixon,* Flt. Lt. B. K. Burnett,* Flt. Lt. R. G. Musson,* Flt. Lt. A. T. D. Sanders. (Sitting, left to right), Flt. Lt. A. N. Combe,* Sqn. Ldr. R. Kellett* (Flight Leader), Wing Cdr. O. R. Gayford, D.F.C., A.F.C. (Officer Commanding Long-Range Development Unit), Flt. Lt. H. A. V. Hogan,* Flt. Lt. P. H. Dunn. Asterisks denote those who took part in the actual flight.

and, apart from storms over the Indies, the crews experienced no discomfort.

Application will be made in due course to the F.A.I. for homologation of the record, the preliminary formalities required by the Federation for official observance of the departure and for the sealing of the airframes, engines, and petrol tanks having been made by the Royal Aero Club of Egypt on behalf of the Royal Aero Club of the United Kingdom.

After having stayed at Darwin for about four days the machines are to fly on to Sydney by way of Cloncurry.

The route taken was not a true Great Circle course, it being almost impossible to choose a Great Circle route to the east which does not involve flying over high mountains or enormous stretches of sea. The distance submitted to homologation was measured on the Great Circle. It was planned that from Ismailia the Wellesleys should steer a course as near as possible to the Great Circle route, passing through Port Darwin.

The actual route was by way of Jask, across India, passing just north of Hyderabad, across the Bay of Bengal, and, after picking up Port Blair, Andaman Islands, flying north-east of Singapore, thence across Borneo and the Timor Sea to Darwin. Further particulars are given in the radio log of the flight at the end of this report.

The Long-Range Development Unit was officially formed in January, 1938, at Upper Heyford with a view to the further investigation of the Service problems associated with long-distance flying. Wing Cdr. O. R. Gayford, D.F.C., A.F.C., was placed in charge of the Unit in view of his previous experience, having made, in conjunction with Flt. Lt. Bett, the first non-stop flight from England to Egypt in October, 1931, and early in 1933 with Sqn. Ldr. (then Flight Lieutenant) G. E. Nicholetts, A.F.C., having broken the world's long-distance record on the same Fairey monoplane with a flight of 5,341 miles from Cranwell to Walvis Bay, South Africa. Since the date of formation of the Unit long-distance flying training has been carried on continuously. On July 7 this year four aircraft of the Unit completed a flight from Cranwell to Ismailia, *via* the Persian Gulf, of 4,300 miles in about 32 hours, returning to Upper Heyford on July 21 and leaving again for Ismailia on October 25, staying the night of the 24th at Malta.

At Ismailia there is a special runway in a north-west—south-east direction. This is 1,200 yd. long and 50 yd. wide, there being a concrete platform, 450ft. by 70ft., at the south-east end.

The special long-distance Wellesley differs from the standard machine in that it uses the Pegasus XXII engine, a Rotol airscrew, and is fitted with additional tankage in the wing. The forward part of the fuselage is slightly increased in width, and use is made of a gilled long-chord cowling in conjunction with special fairings. Accommodation is provided for the use of the navigator. The all-up weight is approximately 19,000 lb., against the 11,000 lb. of the standard Service type. The wing, which, like the fuselage, is built on the Vickers-Wallis system of geodetic construction, has a very high aspect ratio. Main dimensions are: Span, 74ft. 7in.; length, 39ft. 3in.; and height, 12ft. 4in.

The portion of the fuselage between the front and rear cockpits (which have transparent hoods fitted with sunblinds) is occupied by a totally enclosed cabin. The pilot's seat is adjustable over a range of about 6in., and the whole seat is arranged to hinge backwards into the cabin so that the pilots may change positions, the machine being flown, of course, by the automatic pilot during the actual change-over. One member of the crew can sleep or rest in a bunk in the cabin while the others are on duty. The navigator is accommodated in the rear cockpit with the wireless and navigating instruments. There are side windows which fold up against the roof and do not cause a draught when they are wide open. Racks have been installed for the stowage of books, navigational equipment, and small items of personal property and clothing of the crews.

The machines are fitted with two-way wireless receiving and transmitting sets, two sextants for clerical readings,

three compasses (one for obtaining bearings), and two drift sights.

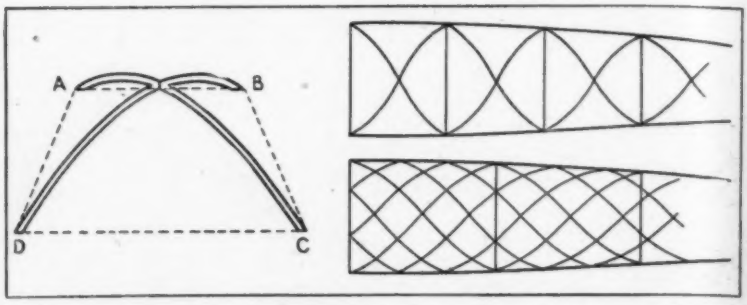
Three naval vessels, H.M.S. *Deptford*, H.M.I.S. *Investigator*, and H.M.A.S. *Swan* were stationed respectively in the Arabian Sea, Bay of Bengal, and Timor Sea to act as an operational link in the chain of communications.

Apart from a slightly higher compression ratio, the Bristol Pegasus XXII in the long-range version of the Wellesley is similar to the standard engines of that mark. It has a Claudel-Hobson automatic carburetter, which has proved that, by eliminating the personal factor in mixture control, it can provide great fuel saving on long flights.

The Pegasus XXII is of 28.7 litres capacity and has a medium degree of supercharge, giving an international rating of 840 h.p. at 4,000ft. Using 87-octane fuel, the take-off output is 1,010 h.p., but the engines in the long-distance Wellesleys were operating on fuel of 100-octane number. The Rotol airscrew is of the three-bladed constant-speed type, hydraulically operated and with a diameter of 12ft. 8in.

Certain of the fuel tanks are fitted with jettison valves. In addition to the extra petrol carried, there is increased oil tankage and a Serck-type cooler. The 100-octane fuel is of a special lead-free nature.

The personnel were provided with Irvinsuits, of a type thermally heated and made of Grenfell cloth with a satin-covered lining of kapok for additional warmth. Anti-glare goggles of special design were issued.



A diagrammatic explanation of the geodetic construction principle, as used in the record-breaking Wellesleys. If a load is applied which will tend to deform the rectangle ABCD, a compressive force will be transmitted through AC, for instance. This will tend to make the member increase its curvature. But at the same time there will be a tension force in BD which will tend to straighten BD. As AC and BD are joined at their centres, the two forces oppose one another, tension acting against compression. In this way the loads in the members are reduced almost to nothing. On the right is shown diagrammatically the simplest form of geodetic construction of a fuselage, and below it the actual practical form in which the number of geodetic bars has been increased and forms the characteristic "basket work" structure.

Radio Messages

Flight is privileged to quote the abbreviated (and somewhat clarified!) signals received at the Air Ministry during the flight. A few are omitted.

Call signs were: (No. 1) GEZHV, (No. 2) GEZHW, (No. 3) GEZHX. These were the signals:—

Time 0405. From LRDU. Three aircraft left 0355.

From Long Range One. Readings at 0500. Height 11,000ft. Bowser 53. True track 135. Climbing gradually to 12,000ft. Autos no good first attempt. Long Range One.

Time 0550. From LRDU. Air Ministry. Long Range One and Two. Position 30 deg. North, 37 deg. 10 min. East. Track 099, speed 180. Overcast, bumpy and thunder conditions. GEZHV.

Time 0600. From LRDU. Air Ministry, Long Range Three position 29 deg. 50 min. North, 38 deg. East. Track 100, speed 165. Long Range Three. (L.2680).

Time 0750. From LRDU. Long Range One and Two. Position 29 deg. North, 43 deg. 30 min. East. Track 102, speed 175. Sky partly overcast. Conditions fair.

Time 0954. LRDU. Long Range. Position 27 deg. 55 min. North, 48 deg. 46 min. East (Persian Gulf). Track 105. Speed 175. GEZHV.

Time 1130. From LR1. Position 26 deg. 54 min. North, 53 deg. 16 min. East. Track 107. Speed 165 m.p.h. No favourable wind. Next position at 1530 hr. due. Operator flying.

Time 1200. From LRDU. Long Range Two. Position VEZ QUAIS 108. Speed 164.

Time 1240. From Iraq. Following note received from operator GEZHX at 1220. Will be flying for two hours now.

Time 1405. LR1 position 70 mile East of Jask on track. In darkness now. Time 1500.

Time 1542. From LRDU. Ambala. Air Ministry. Long Range Two. Position 24 deg. 00 min. North, 63 deg. 30 min. East. Track 108. Speed 165. GEZHW.

Time 1600 hr. Air Ministry. Long Range Three. Position 23 deg. 52 min. North, 53 deg. 57 min. East. Track 107. Speed 165. GEZHX.

From Ambala. Air Ministry. Long Range Three. Position 23 deg. 52min. North, 63 deg. 75 min. East. My true track 107. Speed 165. GEBHX.

Time 1604. From Ambala. Air Ministry. Long Range 1. Position Lat. 23 deg. 30 min. North, Long. 64 deg. 38 min. East. Track 109, Speed 160.

Time 1650. From Ambala. Long Range 1. On track. Bearing 213 deg. through from Karachi. GEZHV.

Time 1735. From LRDU. Ambala. Long Range 2. Air Ministry. GEZHW. 22 deg. 00 min. North, 57 (? 67) deg. 20 min. East. About 50 miles from course. Half-way between Karachi and Bombay.

Time 1800. From Ambala. Long Range 1. Crossing east coast of India, request VWK inform Deptford on 333 kcs. GEZHV.

Time 1905. Ambala. Position 21 deg. 50 min. North, 70 deg. 10 min. East. GEZHV.

LRDU via Ambala. Time 1930. Long Range 1. Position 21 deg. North, 72 deg. 50 min. East. Track 114. Speed 165. GEZHV.

Time 2000. From GEZHW. Position 150 miles 25 North of Bombay. Track 132. Speed 155.

Time 2150. L.R.D.U. via Ambala. Position 19 deg. 30 min. North, 76 deg. 00 min.

Time 2345. From R.A.F. Ambala. From GEZHW. L.R.2 Position 17 deg. 10 min. North, 81 deg. 25 min. East. Track 116. Speed 155. GEZHW.

Time 0010 from R.A.F. Ambala. Air Ministry Long Range 3. Position 17 deg. 05 min. North, 81 deg. 45 min. East. Track 115, speed 148. GEZHX.

Time 0056. From R.A.F. Ambala. L.R. 1. Position 18 deg. North, 83 deg. 30 min. East. Track 120. Speed 160. GEZHV.

Time 0220. From Bombay Fort via Admiralty. In touch with Long Range Flight who are now approaching Port Blair.

Time 0340. From Ambala. L.R.2 received by *Investigator*. Have just entered patch of high clouds to east of your position.

Time 0345. From Ambala. Air Ministry Long Range 1. Expect to pass Port Blair at 0500 G.M.T. Weather as forecasted.

Time 0400. From Ambala. Air Ministry from L.R.2. Position 13 North, 90 East. Track 116. Speed 150.

Time 0519.2. From Ambala. Following received from *Investigator*. Communication failed with L.R. flight at 0402. The whole flight should have passed Port Blair by 0515.

Time 0654. From Ambala. Following received from Bombay. Following received from GEXHV-GEZHW. ETA 0540. Position south of Port Blair. Have you passed yet please?

Time 0642. From Ambala. Following received from Bombay. Bombay Fort from Norfolk. GEZHX. Last heard at 0547. Calling VWF 1. Strength Six. Note good and steady. Fading strength.

Time 0708. From Ambala. Following received from Coconada. Following part of message received at 0658. Four miles south of Port Blair.

Time 0534. From Ambala. Long Range 1. QAF Little Andamans Isles at 0534. Track 106. Speed 140.

Time 0800. From Singapore. Air Ministry from L.R.2. Position 0930 North, 9600 East. Track 122. Speed 145. ETA Darwin. 0230.

Time 0815. From Ambala. L.R.3 crossing Malaya Coast well north of track. My track 135. Speed 160. GEZHX.

Time 1114. From Singapore. Following from L.R.1. Position 4 deg. 44 min. North, 103 deg. 41 min. East. Track 122. Speed 160. Sundown crossing East Malaya Coast.

Time 1200 Singapore. Following from L.R.2. Position Tewbal Island. Track 123. Speed 150. GEZHW.

Time 1200. From Singapore. Following from L.R.3. Position 4 deg. 5 min. North. 104 deg. 40 min. East. Track 123. Speed 160. GEZHX.

Time 1515. From L.R.D.U. Long Range 1 near South West coast of Borneo. Weather as forecasted. Am flying in storm.

Time 1515. From Singapore. Following received. Please pass to GEZHW (2) and GEZHX (3). Aircraft will rendezvous off Lomblen Isle 8 deg. 15 min. S. 123 deg. 5 min. E. at approximately 2357 (?9) hrs. Exact time and height to be signalled. W/T. operator to keep full watch.

Time 1600. From Singapore. Air Ministry London. From Long Range 2. Position is Equator 111 E. Track is 130. Speed 150. GEZHW.

Time 1600. From Singapore. Air Ministry Long Range 3. Position is 00 deg. 30 min. South, 111 deg. East. Track 135. Speed 150. GEZHX.

Time 1800. From Singapore. Long Range 1. Position is 3 deg. 23 min. South 116 deg. 12 min. East. Track is 122. Speed 140. ETA. Darwin 0315 7/11.

Time 2000. From Singapore. Air Ministry Long Range 3. Position 5 deg. S., 118 deg. E. Track is 120. Speed 150.

Time 2055. From Singapore. Air Ministry Long Range 1. QAF Pulau Salayar at 2026 G.M.T. ETA Lomblen Isle 2230 G.M.T. GEZHV.

From Singapore. Air Ministry, London. From Long Range 2. Position 05 deg. 00 min. South, 119 deg. 00 min. East. Track 122. Speed is 145.

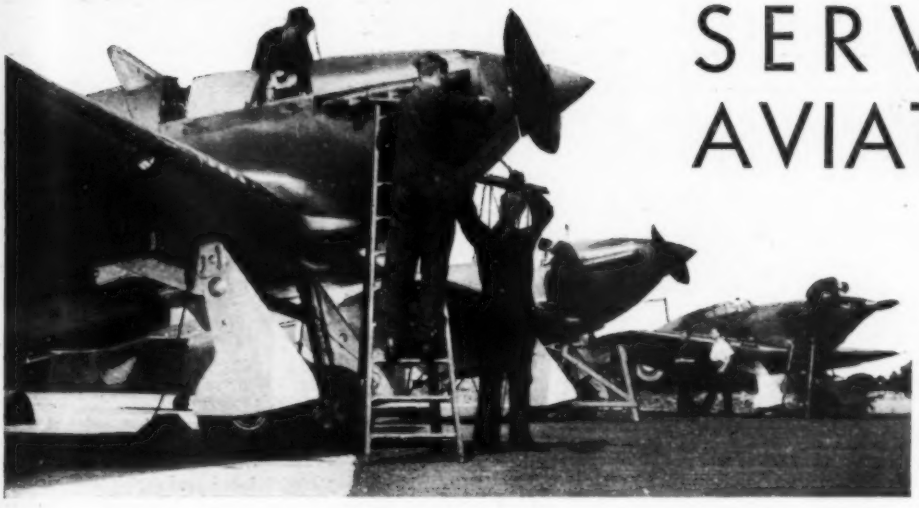
From Singapore. Following from GEZHX. Position North Coast Timor. Track 122. Speed 140. ETA Darwin 0320.

Time 0346. Following from GEZHX at 0042. G.M.T. GEZHV. Long Range 1. Position 9 deg. 21 min. South, 125 deg. 16 min. E. L.2638 and L.2680 landing Darwin at 0430 G.M.T. L.2639 landed Koepang due petrol shortage 0013 (G.M.T.).

Time 0520. From Royal Australian Air Force H.Q. Melbourne. Following from GEZHV Long Range Aircraft 1 and 3 in formation over Darwin. GEZHV and GEZHX landing Darwin 0400 G.M.T.

From R.A.A.F. Melbourne. Time 0606 Following from Darwin. From Long Range 2. Left Koepang for Darwin at 0400 G.M.T.

SERVICE AVIATION



Ministering to Hawker Hurricane eight-gun fighters of No. 111 (F.) Squadron, Northolt.

Royal Air Force and Official Announcements :

Fleet Air Arm News : Military Aviation Abroad

Canadian Officers Arrive

NINE Pilot Officers trained in the Royal Canadian Air Force at Trenton, Ontario, for the Royal Air Force, arrived at Tilbury on Saturday, November 5, on board the s.s. *Ausonia* from Montreal.

They are the first draft of short-service commission officers to arrive in this country to complete their flying training under the Anglo-Canadian Trained Cadet Scheme recently concluded.

The scheme provides for 15 selected officers to receive one year's training with the Royal Canadian Air Force each year. They then come to this country to serve for five years on a short service basis with the Royal Air Force. At the conclusion of their Royal Air Force service the officers transfer to the Royal Canadian Air Force Reserve for a further four years.

The nine members of this year's contingent are: P/O.s (Prov.) W. B. Hodgson, A. A. Deacon, T. P. Harnett, J. C. Campbell, H. F. Marcou, Illsley, R. H. Melanson, C. A. Ross, R. H. Cox.

An R.A.F. Shipload

THE biggest contingent of officers and men of Royal Air Force ever to be sent overseas in one ship as part of the ordinary trooping programme left Southampton on Tuesday, October 25, on the transport *Nevassa*. These officers and men replace others who have completed their tour of service overseas. Air Force personnel travelling on the *Nevassa* numbered approximately 1,000, many accompanied by their families, thus making a full complement for the troopship. Normally transports are shared by the Army and Navy and it is very unusual for the full capacity to be used by the Royal Air Force. The contingent is under the command of Group Capt. A. W. F. Glenny, M.C., D.F.C., and will be dispersed over various overseas units in Iraq, India, Aden, Khartum and Malta.

New V.R. Centres

THREE further Royal Air Force Volunteer Reserve training centres, bringing the total to 32, will shortly be available and applications are invited immediately from candidates resident in these districts for training as pilots. The new centres are situated at Belfast (Sydenham), Bristol (Whitchurch), and Southend-on-Sea.

Candidates need have no previous flying experience but must be between the ages of 18 and 25, physically fit and of good education. The initial period of service is for five years and reservists receive a retaining fee of £25 for each year of satisfactory service. Pay and allowances are given for periods of continuous training and an allowance to cover out-of-pocket expenses incurred in training at all other times is made.

Reunion Dinners

THE first reunion dinner for Royal Air Force Specialist Navigation Officers will be held at 7.30 p.m. on Friday, November 25, at the Royal Air Force Club, 128, Piccadilly, London, W.1. The price of tickets, excluding wines, will be 10s. each. Dinner jackets will be worn. A limited number of guests may be invited provided they have been associated with the Schools of Air Navigation, Naval Co-operation or General Reconnaissance. Those intending to be present should notify Sqn. Ldr. C. E. Chilton, Headquarters, Bomber Command, Royal Air Force, Hillingdon House, Uxbridge, Middlesex, as soon as possible.

The sixth reunion dinner of the officers of No. 203 (General Reconnaissance) Squadron (formerly No. 203 (Flying Boat) Squadron) will be held at 7.30 p.m. on Friday, December 2, at the Royal Air Force Club. A.V-M. W. L. Welsh, C.B., D.S.C., A.F.C., will preside. The price of tickets, excluding wines, will be 12s. 6d. each. Dinner jackets will be worn. Guests may be invited provided they have been associated with the work of the squadron in the Persian Gulf. Those intending to be present should notify Wing Cdr. J. S. Chick, M.C., A.F.C., Headquarters, Bomber Command, Royal Air Force, Hillingdon House, Uxbridge, Middlesex, as soon as possible.

The eighteenth annual reunion dinner of No. 3 Squadron, R.F.C. and R.A.F., is to be held at the Grosvenor House, Park Lane, London, W.1, on Friday, December 2, 1938, at 8 p.m. for 8.15 p.m. Tickets are 25s. each, including cocktails and wine. They may be obtained from the Hon. Secretary, No. 3 Squadron Dinner Club, F/O D. T. Collins, R.A.F., Kenley, Whyteleafe, Surrey. The Hon. Secretary is very anxious to get in touch with past members of the Squadron.

Movement of Headquarters

THE H.Q. of two Groups in the Coastal Command moved to new stations on November 1. No. 16 (Reconnaissance) Group moved from Lee-on-Solent to Chatham, and No. 18 (Reconnaissance) Group moved from Lee to Donibristle. The latter Group was formed on September 1 under the command of Air Comdre. C. D. Breese.

Balloon Squadrons for Sheffield

LORD SCARBOROUGH, Chairman of the West Riding T.A. and A.F. Association, has announced that three Balloon Barrage squadrons are to be raised in the Sheffield area with an establishment of seven officers and 250 men each.

Recruiting Return

THE total number of men enlisted during the past week is 845, making a total of 11,570 since the campaign began eighteen weeks ago. The applications during the week for entry in the various classes were 1,518; as airmen 1,392, as pilots 119, as observers 7.

R.A.A.F. Badge

RECENTLY more than a hundred men were applying daily in Sydney alone for entry into the Royal Australian Air Force, in reply to a demand for nine hundred recruits to meet the needs of the Government's expanded programme.

An Australian wedge-tailed eagle and sprigs of wattle have been selected as the central features of the design for a general badge for the R.A.A.F. The design is based on that of the R.A.F. In addition to the R.A.A.F. badge, each squadron will have its own special crest, in which different Australian birds will figure.

Chigwell Balloon Units Celebrate

THE Emergency Unit formed from Nos. 908, 909 and 910 (County of Essex) Balloon Barrage Squadrons of the Auxiliary Air Force were entertained to dinner at their Headquarters, No. 4 Balloon Centre, Chigwell, on Monday night, October 31, by Sqn. Ldr. D. A. J. Buxton, the Officer Commanding No. 909 Squadron.

Sqn. Ldr. Buxton commanded this Emergency Unit during the

SERVICE AVIATION (CONTINUED)

crisis, when the officers and airmen who were on the strength of these three squadrons on September 28 were embodied.

About 100 were present as Sqn. Ldr. Buxton's guests at the dinner, at which he thanked all ranks for the services they had rendered during the period of embodiment. Air Comdre. B. C. H. Drew, the Officer Commanding No. 4 Balloon Centre, was the guest of honour.

Recruits are still wanted for these three squadrons. Age limits are 25 to 50. Those desirous of joining should apply to the Adjutant of the squadron in which they desire to serve, at No. 4 Balloon Centre, Chigwell.

Australia Orders Lockheeds

MR. LYONS, the Federal Prime Minister, stated recently in the House of Representatives that the Australian Government has decided to buy fifteen Lockheeds—presumably similar to the Fourteens ordered by the British Air Ministry—for the Royal Australian Air Force. The measure is a precautionary one in the event of the non-delivery of machines from Great Britain.

Lysanders for Egypt

UNDER the terms of the Anglo-Egyptian Treaty of 1936, Westland Aircraft, Ltd., are supplying a number of Lysander Mark I army co-operation machines to the Egyptian Government. The aircraft are similar in practically all respects to those being delivered to the Royal Air Force and are fitted with Bristol Mercury XII engines. An item of additional equipment is the Vokes air cleaner.

Flying Accidents

THE Air Ministry regrets to announce the following accidents:—P/O. Roy Stamford Chill (pilot) and L.A/C. Leslie Vernon Wilton lost their lives in an accident which occurred at Khormaksar, on October 22, to an aircraft of No. 8 (Bomber) Squadron, Khormaksar, Aden.

P/O. Franklin Gordon Hanlan (pilot) and A/C.1 Christopher Peter Timothy Bowring lost their lives, Flt. Sgt. Frank Clifford Noyes was dangerously injured, and A/C.1 Andrew Moffat Fleming was slightly injured in an accident which occurred at Aldwark, Yorkshire, on October 22, to an aircraft of No. 51 (Bomber) Squadron, Linton-upon-Ouse, Yorkshire.

A/C.1 Harold Roy Lee lost his life as the result of a collision in the air which occurred near Uffington, Lincs, on November 3 between two aircraft of No. 23 (Fighter) Squadron, Wittering, Northants. Sgt. Jack Arnold Bullard was the pilot and A/C.1 Lee the occupant of one aircraft and P/O. Arthur Edward Slocombe was the pilot and sole occupant of the other aircraft. The two pilots were not injured.

A.P/O. John Owen Sowerbutts (pilot) and A/C.1 William Ashbridge and A/C.2 Horace Redfern (crew) lost their lives in an accident which occurred near Middleton-in-Teesdale, Durham, on October 26, to an aircraft of No. 34 (Bomber) Squadron, Upper Heyford, Oxfordshire.

Royal Air Force Gazette

Royal Air Force

General Duties Branch

A.V-M. C. L. Courtney, C.B., C.B.E., D.S.O., is granted the acting rank of Air Marshal (unpaid) (October 1).

Flt. Lt. E. J. Palmer is granted a permanent commission in that rank (July 29).

The following Flying Officers are promoted to the rank of Flight Lieutenant on the dates stated:—S. C. Elworthy, P. J. Sanders (Acting Flight Lieutenant) (seniority June 3); H. L. Maxwell (Captain, Northamptonshire Regiment) (seniority September 16, 1937), (September 16); C. J. S. Dickins (September 16); G. A. Kitching (October 3); J. D. C. Joslin (Acting Flight Lieutenant) October 16); J. R. Leggate (October 3); A. H. Donaldson, H. L. Dawson (October 16); W. E. Carr (October 19).

Sqn. Ldr. E. A. Beaulah is granted the acting rank of Wing Commander (paid) (August 3) (substituted for notification in *Gazette* of October 11).

The following Flying Officers are granted the acting rank of Flight Lieutenant on the dates stated:—R. E. X. Mack (September 1); A. C. Brown (September 17); W. C. A. Church (September 26); G. F. Lerwell (October 15); G. H. Sheehan (October 9); O. R. C. Moseley (October 15); J. E. Innes-Crump, E. H. Jago (October 19).

F/O. W. E. Surplice relinquishes the acting rank of Flight Lieutenant (October 14); Lt. N. E. Ward, R.N., Flight Lieutenant, R.A.F., ceases to be attached to the Royal Air Force on return to naval duty (October 10); Lt. A. F. Anderson, the Royal Warwickshire Regiment, is re-seconded to the Royal Air Force as Flight Lieutenant with effect from October 24 and with seniority of October 24, 1936; Flt. Lt. A. J. W. Geddes, Captain, Royal Artillery, ceases to be seconded to the Royal Air Force on return to Army duty (October 19).

The following Squadron Leaders are placed on the retired list at their own request on the dates stated: J. S. Harrison (October 31); A. H. Love (November 1).

Flt. Lt. J. S. Wilkins is placed on the retired list (October 29); Flt. Lt. G. F. Overbury is transferred to the Reserve, Class A (November 1).

Equipment Branch

Group Capt. F. C. Williams, O.B.E., is placed on the retired list at his own request (November 1).

Chaplains Branch

The Rev. J. T. Pumphrey is granted a short service commission with the relative rank of Squadron Leader (October 17).

Princess Mary's Royal Air Force Nursing Service

Sister Miss J. P. I. Woods resigns her appointment.

Royal Air Force Reserve

Reserve of Air Force Officers

General Duties Branch

Flt. Lt. H. J. Wilson is transferred from Class A to Class C (September 13); Flt. Lt. J. R. S. Agar relinquishes his commission on appointment to a commission in the Royal New Zealand Air Force (August 18).

Flt. Lt. T. H. Burleigh is transferred from Class A to Class C (September 12, 1937). Flt. Lt. W. E. G. Beauforte-Greenwood relinquishes his commission on completion of service and is permitted to retain his rank (March 30).

Medical Branch

Flt. Lt. J. J. Corcoran, M.B., B.Ch., relinquishes his commission on completion of service (October 1).

Royal Air Force Volunteer Reserve

Medical Branch

F. W. Roques, M.D., M.Ch., F.R.C.S., F.C.O.G., is granted a commission as Squadron Leader (October 25).

Auxiliary Air Force

General Duties Branch

No. 502 (ULSTER) (BOMBER) SQUADRON.—Flt. Lt. B. G. Corry relinquishes his commission (October 5).

Auxiliary Air Force Reserve of Officers

General Duties Branch

B. G. Corry is granted a commission as Flight Lieutenant in Class C (October 5).

Owing to the greatly increased length of these lists, as a result of R.A.F. expansion, ranks are confined to those of Flight Lieutenant and above.

FOREIGN SERVICE NEWS

More Portuguese Gladiators

AN order has been placed by the Portuguese Government for thirty Gloster Gladiator four-gun fighters additional to the fifteen lately delivered to Portugal. The machines are fitted with Bristol Mercury IX engines.

German Fighters for Switzerland

IT is reported that the Swiss Federal Government has ordered from Germany a number of fighters—presumably Messerschmitts or Heinkels—and that they will be delivered very shortly. Fitted with an engine (Daimler-Benz or Junkers) of 1,100 max. h.p., the machines will be capable of 334 m.p.h. and will be able to reach 15,000ft. in five minutes. Each will cost about £13,000 completely equipped.

German Promotions

FOUR senior officers of the German Air Force have lately been promoted. General Milch is advanced to the rank of Colonel-General, while Lt. Col. Stumpff, Chief of the General Staff of the Air Force, becomes General of the Air Force. Major Gen. Udet, Chief of the Technical Bureau of the Air Force, is promoted Lieutenant General. Lt. Col. Jeschonnek, Chief of the Directional Staff of the Air Force General Staff, becomes a Colonel.

New German Fighters

AMONG the new German fighter prototypes are said to be a twin-engined Messerschmitt and a Focke-Wulf pusher. The Messerschmitt is designated the Me110 and is powered with two Daimler-Benz inverted-vee liquid-cooled DB-601 engines of 1,360 h.p. each. Armament includes shell-guns and the speed is nearly 400 m.p.h.

PRELUDE to PARIS

A Bristol Preview

ON Tuesday of last week certain Bristol aero engines were "at home" to a large number of admirers invited to Filton to see them before they were put into their packing cases and labelled "Grand Palais des Champs Elysées." The gathering was a very distinguished one, and included representatives of the Air Ministry and the aircraft industry. Unfortunately, the "long-nosed" Blenheim, which will be the largest single exhibit on the Bristol stand, had already been packed and dispatched, but its absence was scarcely felt among so much excellence of workmanship.

Workmanship and finish are always synonymous with Bristol products, but the engines to be exhibited this year really make one sit up. The Pegasus and Perseus are well-known types by now, but for all that they will be very closely inspected by connoisseurs at the Paris Show.

Extremely interesting was the Hercules sleeve-valve engine in its standardised cowling and mounting unit. It is logical to leave it to the engine manufacturer to design the mounting and cowling for his engines, and in this Hercules installation, intended for a twin-engined or four-engined monoplane, the Bristol company finishes, so to speak, at the fireproof bulkhead, which is the point at which the aircraft designer takes over. The Hercules has the new gear box for auxiliary drives, and in the standardised mounting there is no crowding of components at the back of the engine; all accessories can be got at readily for inspection and servicing.

A Rotol airscrew attracted much attention, and one gathered that large numbers of impregnated wooden blades have been ordered for it by the Air Ministry, in addition to the usual light metal blades. The part-sectioned two-speed supercharger, slowly run by an electric motor, shows admirably the inner mysteries of this addition to the Bristol range.

And then there was the —, but no, we mustn't say. There was an engine of unmistakable Bristolian appearance, but until the Paris Show it is on the secret list, and therefore unmentionable. So secret is it that on the previous Sunday, when Bristol's workpeople and their wives and families were invited to inspect the Paris Show engines, this particular one had to be withdrawn at the request of the Air Ministry for fear that it would be seen by the people who built it. . . .

These random snaps show, from left to right (top) Mr. F. McKenna, of the Gloster company, Group Capt. Maycock, of Handley Page, Capt. P. D. Acland (Westland) and Air Comdre. N. J. Gill. Left to right (below): Mr. A. H. R. Fedden, designer of the Bristol engines, Major H. C. M. Stevens (Avimo), and in the right-hand group Lord Austin and Mr. L. P. Lord discussing production problems, possibly connected with the newly cowled Hercules engine behind them, with the Managing Editor of *Flight*, Mr. G. Geoffrey Smith.

"Flight" photographs.

A PARLIAMENTARY VISIT TO CHELSEA

ON October 27 the Rt. Hon. Sir Kingsley Wood, M.P., Secretary of State for Air, was to have paid his first official visit to the College of Aeronautical Engineering at Chelsea. Unfortunately, urgent business of State prevented him from attending. However, his Parliamentary Private Secretary, Sir Edward T. Campbell, M.P., was able to be present in his place.

In company with Lord Sempill, Cdr. H. E. Perrin, Mr. Lindsay Everard, M.P., and Mr. A. Limb (representing Viscount Wakefield), Sir Edward Campbell set out on a tour of inspection. The party were shown the very complete machine shop, woodwork shop, drawing office and the foundry, where a mould was filled, disclosing in glowing terms the phrase "Welcome, Sir."

In the aero engine shop, surrounded by Rolls-Royce Buzzards, Bristol Mercuries, Pobjoys, D.H. Majors, and so forth, which are with monotonous regularity torn apart only to be put together again, Sir Edward willingly obeyed the commands of a horde of photographers. After visiting various other shops, Sir Edward addressed the students on behalf of the Secretary of State for Air. Before leaving, he was thanked by Mr. C. H. Roberts, the Principal of the College.

R.Ae.C. OFFICIAL NOTICES

Prohibited Areas : Cheaper "A" Licences : Forthcoming Events

Green Means Stop

GERMAN police aeroplanes painted light green patrol the Aachen, Trier, Palatinate and Baden prohibited areas near the Western frontier. To ensure that private flyers observe the regulations they will require any pilots infringing them to land by firing white pyrotechnical lights. If this signal is not obeyed fire will be opened on the aircraft. The police aeroplanes are also marked D-POL, followed by a number.

The above regulations were instituted at the same time as the Western prohibited areas were announced, and they remain in force after the lifting of the general ban on private flying in Germany. Entry into the Sudeten German areas is still prohibited though transit over them is allowed. The Vienna prohibited area has been abolished.

More Prohibited Areas

Belgium.—Attention is drawn to the new areas round Namur and Liége; particulars are available in the Royal Aero Club. *Hungary.*—The Hajmasker area near Lake Balaton has been considerably extended. Flights within a radius of 20 km. of the centre of Budapest are prohibited. *Poland.*—Flight over Teschen Silesia is prohibited.

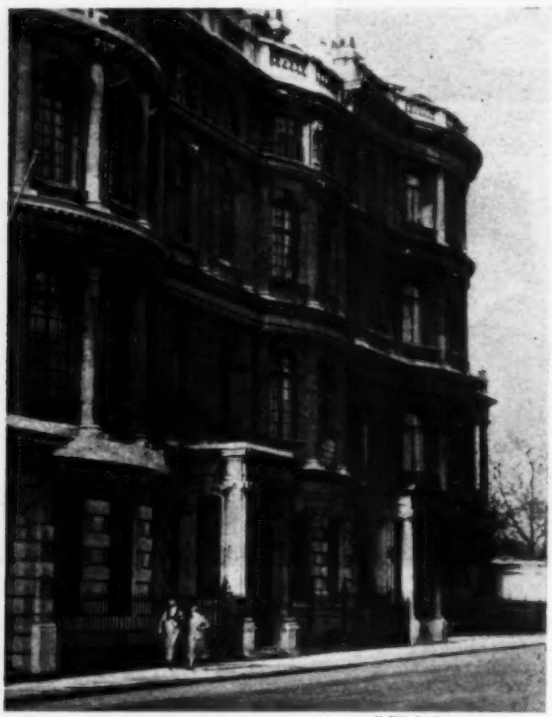
Aviation Information in Foreign Countries

Egypt.—New regulations concerning flying over certain routes by single-engined aircraft not fitted with wireless have been received.

South Africa.—A list of new emergency landing grounds in the Union and in South West Africa is available.

Aviators' Certificate for 10s.

The Committee of the Royal Aero Club has decided to make a contribution to the progress of the Civil Air Guard movement by reducing the cost of all Aviators' Certificates from £1 1s. to 10s.



"Flight" photograph.

ROYAL AERONAUTICAL SOCIETY'S NEW HOME: No. 4 Hamilton Place (at the Piccadilly end of Park Lane), into which the R.Ae.S. will be moving early in 1939 from its present H.Q. in Albemarle Street. No. 5, to the right, has been taken by Capt. L. F. Plugge, F.R.Ae.S., M.P. for the Chatham Division, Rochester.

Entente Cordiale

The Royal Aero Club has entered into a reciprocal arrangement with the Aero Club de France whereby its members visiting Paris will be made temporary honorary members of the Aero Club de France. The amenities include lounge, writing rooms, library, restaurant and bar.

As the Aero Club de France have no bedrooms they have made arrangements for such accommodation to be available at the Baltimore Hotel, Avenue Kleber, close to the Club (bed, bath and English breakfast 9s. 6d.). The address of the Aero Club de France is 6, rue Galilee, Paris.

Deauville Rally, 1939

The 1939 Deauville Air Rally will be held on July 15, 1939. Full particulars will be announced later.

Committees

During the week ended October 29 the following committees met at the Royal Aero Club:—

Royal Aero Club.—Main committee, finance committee, house committee.

British Gliding Association.—The council, technical committee, finance committee.

Record

The Royal Aero Club has passed the following record for Distance in the Straight Line, Seaplanes, and it has been submitted to the F.A.I. for homologation as an international record:—

AIRCRAFT: Short-Mayo Float Seaplane Monoplane, upper unit of the Short-Mayo Composite aircraft. ENGINES: 4 Napier Rapier. PILOT: D. C. T. Bennett. CREW: I. Harvey (2nd Pilot and W/T Operator). From: Dundee to Orange River. Date: October 6-8, 1938. Time: 41 hr. 56 min. Distance: 9,652.001 km. (5,997.5 statute miles).

Coupe Deutsch De La Meurthe

The Royal Aero Club has been notified by the Aero Club de France that the race for the Coupe Deutsch will be held on October 1, 1939, at Etampes. The prize, apart from the Cup, amounts to 200,000 francs. The race will be a speed scratch race over a distance of 2,000 km., flown over a circuit of 100 km. in two sections of 1,000 km. each, with a compulsory stop between the sections.

The total cylinder capacity of the engine or engines must not exceed 6.5 litres. It must be proved by a qualifying flight that the aircraft is capable of a speed of at least 350 km./hr.

The entry fee is 2,000 francs, increased to 6,000 francs for late entries. Half the fee is returnable if the aircraft actually starts in the race.

Entries close on January 31, 1939. Late entries are accepted up to July 12, 1939.

Full particulars may be obtained from the Secretary, Royal Aero Club, 119, Piccadilly, London, W.1.

October 24, 1938. HAROLD E. PERRIN, Secretary.

Walter Mikrons in England

THE Chrislea Aircraft Company, Ltd., who are the sole licensees in this country and the Dominions for the manufacture of the Walter Mikron II engine, have completed arrangements with S. E. Opperman, Ltd., to undertake the manufacture of these engines. Jigging and tooling for a batch of a hundred has been completed, and deliveries will commence next April. The price has been fixed at £190; this includes two magnetos, two plugs per cylinder, carburetter, petrol pump, engine feet, airscrew hub and engine case.

Data for the Mikron II are: Capacity, 2.33 litres; compression ratio, 6:1; take-off power, 55 h.p. at 2,400 r.p.m.; international rating, 55 h.p. at 2,400 r.p.m. at sea-level (max. for climb); maximum power for level flight, 62 h.p. at 2,800 r.p.m. at sea-level; normal cruising power (80 per cent.). 50 h.p. at 2,500 r.p.m. at sea-level; fuel, 73 octane (minimum); fuel consumption, 3.25 to 3.5 gal. per hr.; oil consumption, 1.76 to 2.34 pt./hr.; dry weight (with accessories and two magnetos, but less airscrew hub, fuel pump, and engine feet), 134.5 lb. (± 3 per cent.); max. B.M.E.P., 123 lb./sq. in.; height, 24.9in.; width, 13.5in.; length, 28.74in. (without airscrew hub or starter).

FOR BETTER BRAKING

New Bendix System

MANY difficulties confront the designer of modern aircraft brakes. With the advent of retractable undercarriages wheels have tended to diminish in size, while tyre sections have, if anything, increased. As a result the annular space available between hub and rim grows steadily smaller. Again, the more severe braking possible with tricycle undercarriages makes brake-cooling a major problem.

It is with these factors in mind that the Bendix Two Leading Shoe Aircraft Brake has been designed. Both shoes are termed "leading," since both are free to move outwards in opposite directions and also radially. In other words, both are fully floating, enabling the total frictional surfaces to come into complete contact with the drum. Each shoe has its own actuating mechanism which can be hydraulically or pneumatically operated by a system that ensures a complete balance to be maintained between the two.

Each actuating unit is particularly interesting, for through it the input load is transmitted direct from one shoe to the other, none being absorbed by the housing in which the mechanism is enclosed. A plunger inside a cylinder at the back of the torque plate bears upon two large balls which in turn force out two tappets (one tappet being flat faced, the other being wedge shaped). These tappets, moving outwards in opposite directions, operate the shoes. The flat-ended tappet can be adjusted by means of a crown wheel, the squared shank of which protrudes through the dust cover round the torque plate. The crown wheel engages with teeth on the tappet, which is able to rotate inwards or outwards to retract or expand the shoe. This adjustable tappet operates the leading end of the shoe. The wedge-shaped tappet has a large spherical end, over which is seated an angular friction block, into which the pivoting end of the other shoe fits.

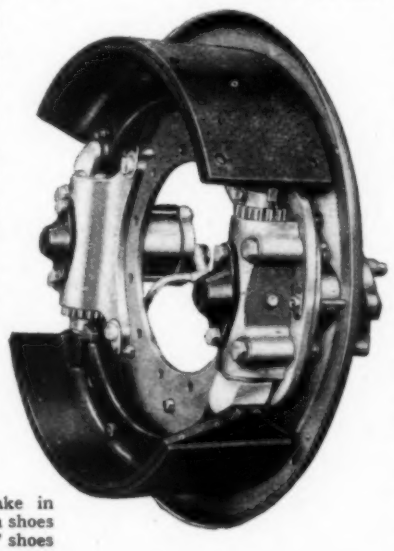
The shoe is friction-located by means of a small compression spring which bears out against the friction block. In this way the end of the shoe is able to pivot about the spherical-ended tappet and also slide outwards in the friction block, but the grip is such that when the brake is released the shoe and friction block are virtually one and pivot as such about the spherical end of the tappet. During braking the shoe slides outwards and comes into complete contact with the drum.

By this system the whole surface of the shoe is evenly withdrawn after application, while, as already mentioned, the shoe faces come into complete contact with the drum on application. An even distribution of pressure is obtained, while the frictional force is increased, it is claimed, by about 25 per cent.

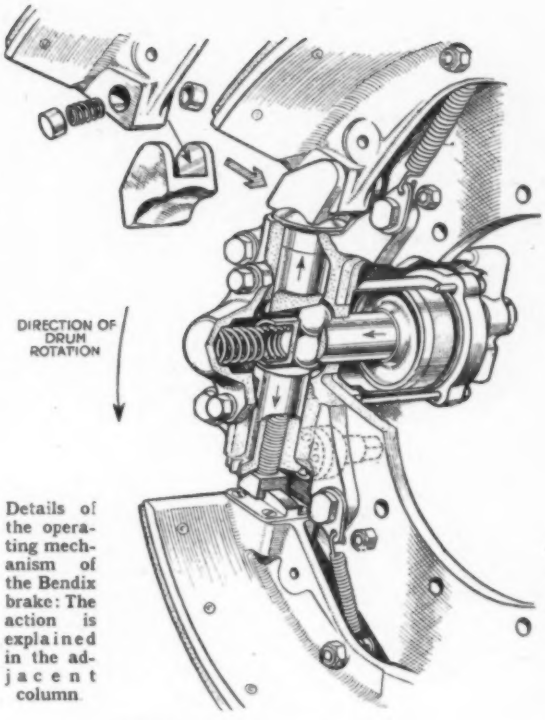
The designers of this new brake claim that a maximum frictional drag is given at the drum surface for a given input load at the shoe tips. The torque load is balanced, the loads from the shoes being carried at diametrically opposite points on the torque plate.

One of the first aircraft companies to specify the new Bendix braking system is the De Havilland Aircraft Co., Ltd., on whose forthcoming D.H.95 it will be fitted in conjunction with the Bendix differential hydraulic gear.

The makers are Bendix, Ltd., Tyseley, Birmingham.



The complete brake in part section. Both shoes become "leading" shoes and each has its own actuating mechanism.



Details of the operating mechanism of the Bendix brake: The action is explained in the adjacent column.

Civic Air Day at Norwich

IN conjunction with Norwich Civic Week, the Norfolk and Norwich Aero Club and the Norwich Chamber of Commerce organised on October 27 a Civic Air Day, which was opened by the Lord Mayor of Norwich.

The Lord Mayor made an inspection of the aircraft, including the four Hawker Hurricanes which had come from the R.A.F. Station at Digby in charge of F/O. D. Kain. After his inspection the Lord Mayor broadcast a short speech, in which he said it was fitting that Civic Week should include a Civic Air Day, for few cities in the British Empire could claim such an early connection with aviation. Civil aviation in Norwich had started in the year 1927, when the Norfolk and Norwich Aero Club was formed.

After the Lord Mayor's speech there were demonstrations by the Gliding Section of the Club of aero-towed and auto-towed gliding. Mrs. J. F. Crossley gave an extremely polished display of aerobatics in a London Club Tiger Moth.

As a preliminary to the demonstration by the R.A.F. machines the Club Instructors, Mr. R. H. Henderson and Baron de Sarigny, in the Club's Moths, gave the crowd some idea of what an aerial combat was like in the last year of the Great War. Naturally, when the flight of Hawker Hurricanes took off in formation a very sharp contrast was made. They gave a demonstration of formation changing in flight and varied their speeds to show the capabilities of the machines. The Surprise Item which followed was an amusing and clever parody, given by Baron de Sarigny, of a first solo flight.

Surrey Gliding Club

AS foreshadowed in several references in *Flight* during the past summer, a gliding club with facilities for all branches of gliding and soaring training is being formed at Buckland, near Reigate, Surrey. A landing ground of 60 acres has been obtained at the foot of the North Downs near Colley Hill, off the main Dorking-Reigate Road, and an Ellis hangar is being erected.

The first machine, which is a primary glider, should be ready by next week-end, and it is hoped that flying training will start on Sunday. All training is to be done by the winch method, and the chief instructor will be Mrs. Joan Price, better known as Joan Meakin.

A secondary machine, which is convertible to an intermediate sailplane, has been ordered, and should be delivered by the first week in December. Next year, if all goes well, a Grunau Baby, and possibly a dual control two-seater, will be added to the club machines, and a small club-house built.

The secretary is Miss Ann Edmonds, and any enquiries should be addressed to her at Buckland Court, Betchworth, Surrey.

BOOSTING the BOURDON

Something New in Boost Gauges

ALTHOUGH the steel-diaphragm type of boost gauge has come to be regarded as the most suitable for aircraft, it has, as a system, one or two disadvantages. For instance its cost, usually, is proportionately high on account of the delicate mechanism necessary to multiply the comparatively small initial movement of the diaphragm.

As an alternative, there is the Bourdon tube-type of gauge. While this variety has many advantages over the steel diaphragm for aircraft boost gauge work, by itself it is not responsive enough. One tube in brass or phosphor-bronze must be made so robust that it may have a big lag. Alternatively, if a fine gauge be used, it may be too delicate.

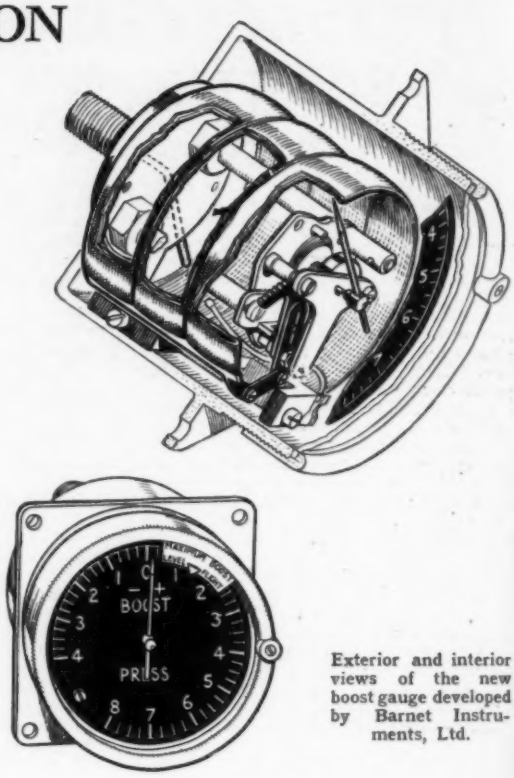
Mr. Robin Grant, of Barnet Instruments, Ltd., Bath Place, Barnet, has specialised in pressure gauges for industrial purposes for many years, and recently he conceived the idea of mounting three phosphor-bronze Bourdon tubes in parallel. In this way he was able to obtain plenty of power with an absolute minimum degree of lag and yet achieve a range of movement up to 1/10in.

Simplicity is the keynote of this new boost gauge. The three Bourdon tubes are mounted side by side in parallel. At one end they are sweated into a common mounting, while at the other extremity they are sealed and soldered to a light metal strip, to which is anchored a short link that operates the rack and pinion mechanism for the indicator. The common mounting is secured to the casing of the instrument. It also serves to link the three tubes by means of a duct through which they can be exhausted simultaneously.

The inherent properties of the Bourdon Tube under the influence of an increase or decrease in pressure, cause the free ends of the tubes to move circumferentially.

The simple rack and pinion gauge movement has an adjustment for setting the instrument on completion. The dial is graduated from −4 lb. to +8 lb.

So that condensed fuel may be drawn off, the inventor has arranged that a small extension pipe leads up the back of the casing from the bottom to the vacuum-pressure pipe union. Whenever the throttle is closed the resultant drop in pressure will cause any condensed fuel that has collected in the bottom of the instrument to be drawn off and led back to the induction system of the engine.



Exterior and interior views of the new boost gauge developed by Barnet Instruments, Ltd.

Much in Miniature

ALTHOUGH there was little really new to be seen this year at the exhibition which is staged annually by the Plessey Company, there were more than indications that the Ilford works are now well down to the job of producing the many important details which make up the modern military machine.

Undoubtedly the most interesting exhibit consisted of two examples of Scintilla magnetos for aero engine use. These magnetos are, of course, well known in Europe and America, where the Bendix Corporation now has the manufacturing control. The Plessey Company has obtained the manufacturing rights for this country and are now tooling up their works for the production of a special version for an aero engine which must not be named. In due course, no doubt, examples will be designed and produced for other engines in service. The Scintilla magneto, which operates on the rotating-magnet principle, has a remarkably good reputation abroad.

Production is now well under way on certain types of Pesco pumps—notably, an engine-driven vacuum pump, which is coming out at the rate of two hundred a week—and the only difficulty seems to be that of redesigning to suit different drives and different attachments. Needless to say, the variations in these are considerable, though there is reason to hope that a great measure of standardisation will soon be established.

Modern machines are fairly well loaded up with electrical equipment of various kinds, and the business of wiring has ceased to be a reasonable matter for individual workmanship. The Plessey Company now produce armoured layouts which can be installed in a very short time and can be turned out ready for immediate installation. All the attachment work involved is concentrated at the junction boxes, and the Breeze Corporation has also developed an extremely neat multiple-plug attachment through which all contacts are made at points such as the engine bulkheads. This type of multiple plug, curiously enough, was originally designed for use in the cinematograph industry and the Breeze Corporation saw at once that it had great possibilities in the aviation industry.

Altogether the exhibition at the Park Lane Hotel gave the visitor a real and satisfying idea of what is going on in the rapid manufacture of small but vitally important items of aircraft equipment.

An Invitation from M.C.L.

M.C.L. AND REPETITION, LTD., who, it is stated, turn out large quantities of precision parts for practically all the British aircraft manufacturers, report the recent installation of a number of the most up-to-date capstans which, with the existing machines, will enable them to give even better service in this direction.

M.C.L. pride themselves on the scientific planning and systematic layout of their large plant, and visitors wishing to see it in operation are welcomed. The address is Langley, Birmingham.

West for Safety

AS briefly recorded in the review of the aircraft accessory and materials section of the Industry in last week's special issue of *Flight*, a new company has been added to the Simmonds group. It has the title of Simmonds Aerocessories (Western), Ltd., and has an authorised capital of £100,000. The directors are Mr. Oliver Simmonds, M.P., and Mrs. Oliver Simmonds.

The French Government has for some months now made it obligatory for all major companies manufacturing for defence to possess at least one factory outside the Paris region, and in general more than one hundred miles to the west or south of Paris, in order to avoid the possibility of the production of essential products being dislocated by air bombardment. In fulfilment of this obligation, Aerocessories Simmonds, the French manufacturing company of the Simmonds group, which until recently had its main factory at Courbevoie, only two miles from the centre of Paris, now has in full production a large factory in the provinces, about 120 miles west of Paris.

In spite of the fact that the factory of Simmonds Aerocessories, Ltd., on the Great West Road, has a bombproof stronghold, the directors have decided that the national advantages of the French system are so manifest that in addition to these works and to those at Birmingham, they have now formed this new company, Simmonds Aerocessories (Western), Ltd., with a very large new works just outside Cardiff. Work has already commenced there, and deliveries to the aircraft industry will begin towards the end of this month.

In no sense, it is stated, will the Cardiff factory be a removal of part of the works at London and Birmingham. Production will be entirely additional to the existing facilities.

The Simmonds group produces, among other things, stop-nuts, controls, navigational instruments, flap and undercarriage indicators, fuel gauges and cowling clips.